In This Quiet Valley

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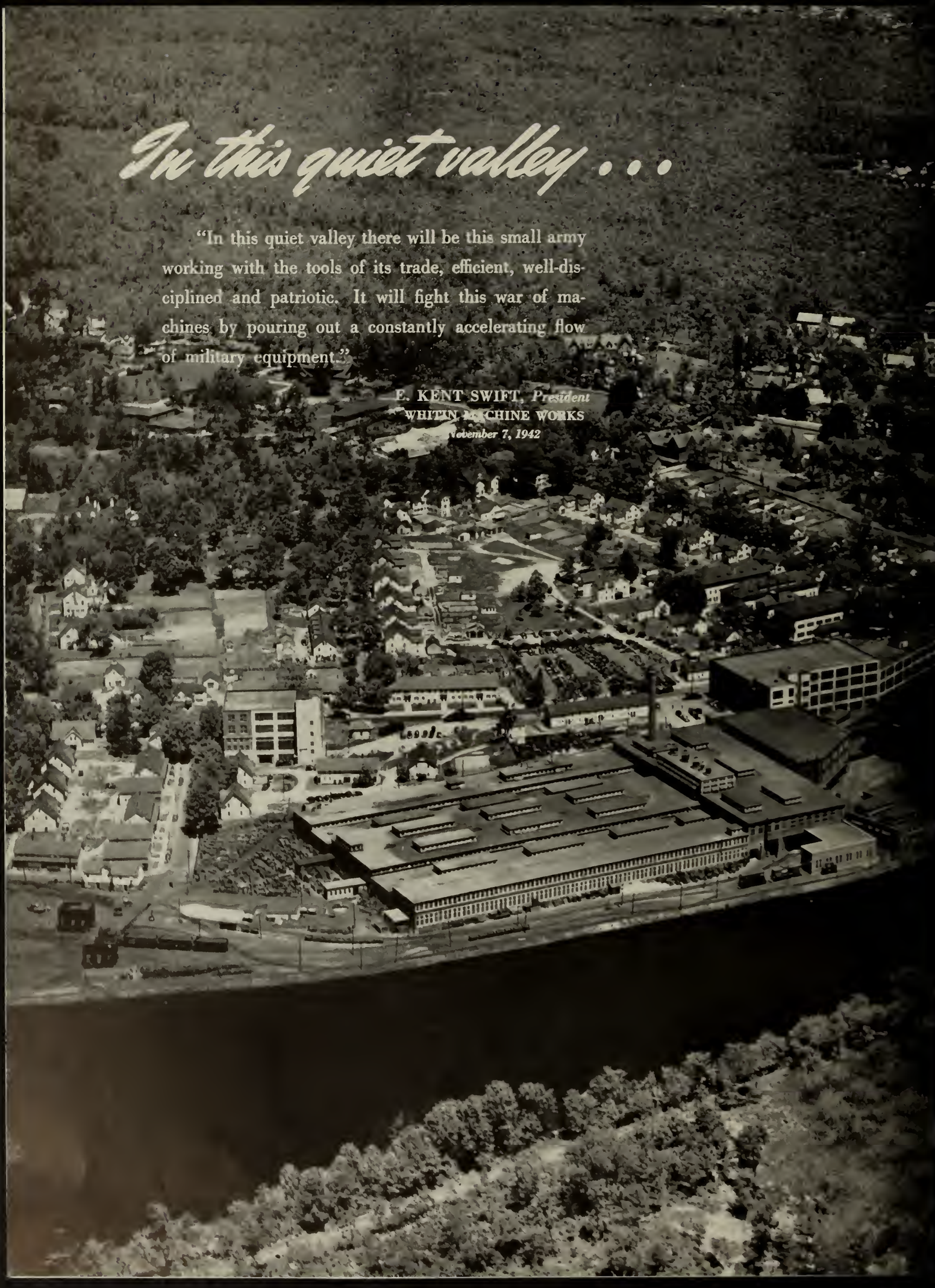
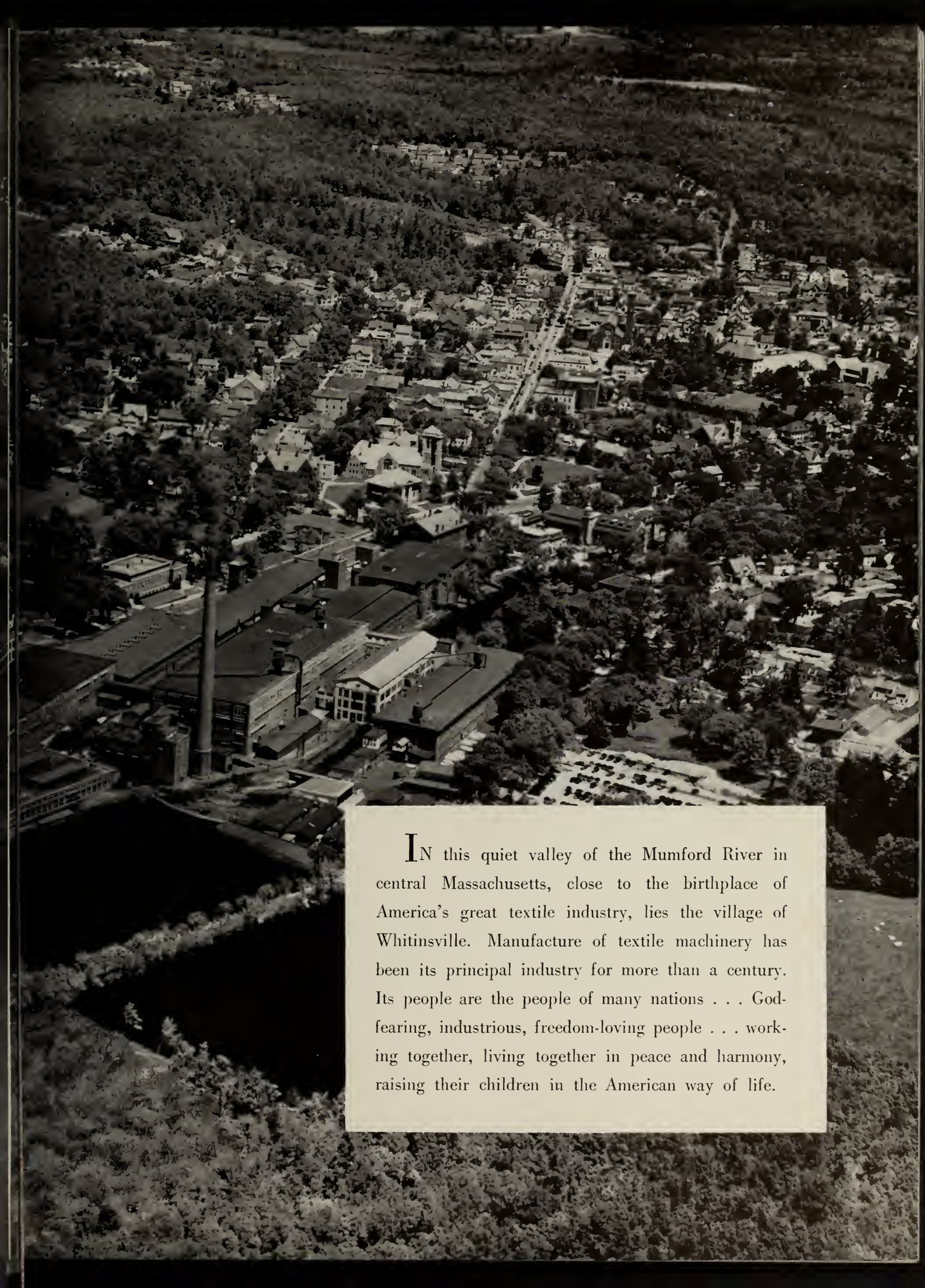
In this quiet valley . . .

A pictorial history of the conversion to, and the production of War products by the Whitin Machine Works during the years of 1941 to 1945.


In this quiet valley . . .
"In this quiet valley there will be this small army working with the tools of its trade, efficient, well-disciplined and patriotic. It will fight this war of machines by pouring out a constantly accelerating flow of military equipment."
E. KENT SWIFT, President
WHITIN MACHINE WORKS
November 7, 1942



IN this quiet valley of the Mumford River in central Massachusetts, close to the birthplace of America's great textile industry, lies the village of Whitinsville. Manufacture of textile machinery has been its principal industry for more than a century. Its people are the people of many nations . . . God-fearing, industrious, freedom-loving people . . . working together, living together in peace and harmony, raising their children in the American way of life.

December 7, 1941

To all this, to Freedom everywhere, the attack on Pearl Harbor was a bold challenge. In the immediate acceptance of this challenge, the American people and their vast industrial resources were pledged to the production of the weapons of war on an unprecedented scale. Ultimate victory depended very largely upon how rapidly industry could convert its plants to the production of these weapons for use against a ruthless enemy who held every advantage in time, distance, and preparation.

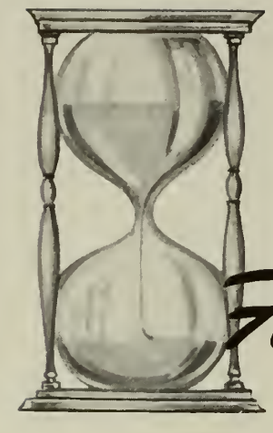
Under the most trying conditions, with speed the watchword everywhere, an aroused people, manning the nation's great industrial facilities with determination, with ingenuity, met the challenge, performed miracles of production, will continue to do so until final and complete victory is ours.

The record of American industry and its people in this war is an inspiring one, well deserving of a place in the history of the nation and of the war.

This is the war story of a plant located in a quiet valley of Massachusetts, of its tools, and of the accomplishments of its 4,500 patriotic and resolute people.

This, one of the most remarkable combat photographs of all times, was made at the exact moment the destroyer, USS Shaw, blew up during the Japanese attack on Pearl Harbor, Hawaii, December 7, 1941.

Official U. S. Navy Photograph



For more than a century

Whitin Machine Works was born in the year 1831 when John C. Whitin developed his improved picker in a small ell of the cotton mill which his father operated on the site of the present shop buildings. Ready acceptance of his invention encouraged him to manufacture pickers for mills which had quickly recognized the merits of his unit, and it was not long before his textile machinery business had grown to such proportions as to dwarf the cotton mill from which it had sprung.

For the next 110 years, expansion of the plant and its line of products for the textile industry continued, through periods of peace and war, through good times and bad. In 1941 Whitin Machine Works entered a period which will be one of the most interesting and important in its long history . . . the period in which 85 percent of its immense facilities was converted to the production of a wide variety of critically needed war materials.

Through this entire span of years, its management has remained in the hands of John C. Whitin's descendants, and the name Whitin is seen on machinery operating in mills in every part of the world.


This is the village

A symbol of home to approximately 10.000 people is Memorial Square in Whitinsville.

The village of Whitinsville and Whitin Machine Works are inseparable. Each depends upon the other. Surrounding the shops, the village has expanded in an ever-widening circle, conforming to the continuing growth of the plant.

A very large percentage of its residents depend directly upon the Works for their livelihood; and the company, in turn, is dependent upon them to furnish the skilled craftsmen that help to maintain the prestige of Whitin machinery. The company also furnishes many services intended to make Whitinsville a pleasant place in which to live.

The Congregational Church and Social Library look out across the park where stand memorials to the men of Whitinsville who gave their lives for freedom in former wars.

Company-owned homes in the Plummer Section. These houses with their well-kept lawns and pleasant surroundings were erected immediately following the last war.

Approximately one-thousand families live in attractive apartments and homes owned by the company and rented to them at exceptionally low rates. The town water system is owned and operated by the company, and a coal and wood business and ice plant are maintained for the benefit of its employees.

Successful merchants have developed a shopping district unusual in its size and scope for a small town, and ample facilities aided by a particularly fortunate geographical location provide all necessary accommodations for both indoor and outdoor recreation.

Services to tenants of company-owned houses include mowing of lawns in summer and snow removal in winter, as well as the many repair and maintenance services that are required for the proper upkeep of property.

Whitinsville's school system bears a high rating in the state. Northbridge High School and Junior High, located in the village, have a large and very well-appointed athletic field.

In addition to company-owned property, the village contains many modern homes built by employees and townspeople.

Erected as a memorial to George Marston Whitin (Treasurer 1886-1920), by his daughters, the gymnasium (foreground) is the indoor sports center. It also serves as the location for social gatherings and exhibitions. The adjacent building is the company cafeteria, put into operation in 1943.

Castle Hill Farm, which numbers 170 animals in its dairy herd, is another company enterprise. It furnishes milk and cream to many residents of the town and supplies milk bars located in various parts of the plant.


These are the people

At noontime, employees leave the shop to lunch at the new cafeteria or go to their nearby homes.

People, more than buildings or tools, make a company successful. It is the spirit of its employees from top to bottom, their ability to cooperate in their work and their planning, that "gets things done" in the best, the quickest, the most economical way.

Whitin Machine Works is exceptionally fortunate in having loyal employees, skilled in their trades, and proud of their workmanship. When war came, these people were glad to be able to apply their various skills to the fashioning of war products.

Broad planning of the company's activities during this critical period fell largely upon the shoulders of these two men — E. Kent Swift, President, Treasurer, and General Manager (left), and J. Hugh Bolton, First Vice-President and Assistant General Manager.

Operation of the mechanical departments of the shop is supervised by F. Eugene Banfield, Jr., Works Manager (seated), and Harry Mitchell, General Superintendent.

Equipped to serve one thousand people an hour, the cafeteria is the favorite dining place of those who live at some distance from the shop.

Long service records are common at Whitin Machine Works. On November 7, 1942 upon the occasion of the Maritime M award, there were present one hundred and twenty-three men — and President Swift was one of them — who had been working at Whitin for more than forty years. A few had records exceeding sixty years.

At the other extreme, demands of the war program required the hiring of a considerable number of new employees including many who had never before worked in an industrial plant. Boys and girls of high school age joined our working force. Former employees came out of retirement to give assistance; housewives dropped their pots and pans to enter the battle of production. In addition, valuable part-time assistance was given by professional people and business men who came into the plant at night after their normal day's work was completed.

Youth was not to be out-done. These girls found that they could make an important contribution on the production front.

Albert J. Brown, Foreman of the Pattern Loft, is a veteran of more than sixty years of service.

Fathers are followed by sons and grandsons in service at Whitin. (Three generations of the Benner family).

Old hands guide the new.

New worker receives instruction in proper method of burring.


This is the plant

the plant

This is the plant. Inside its walls, some of them a century old, are the modern machine tools of every description needed to produce the wide variety of parts that are components of textile preparatory machinery for every branch of the textile industry.

As a result of more than a century of experience and of expansion of facilities, Whitin was able to contribute to the War of Production . . .

56½ acres of manufacturing floor space

3400 machine tools

4500 trained employees

A foundry having a daily capacity of 150 tons

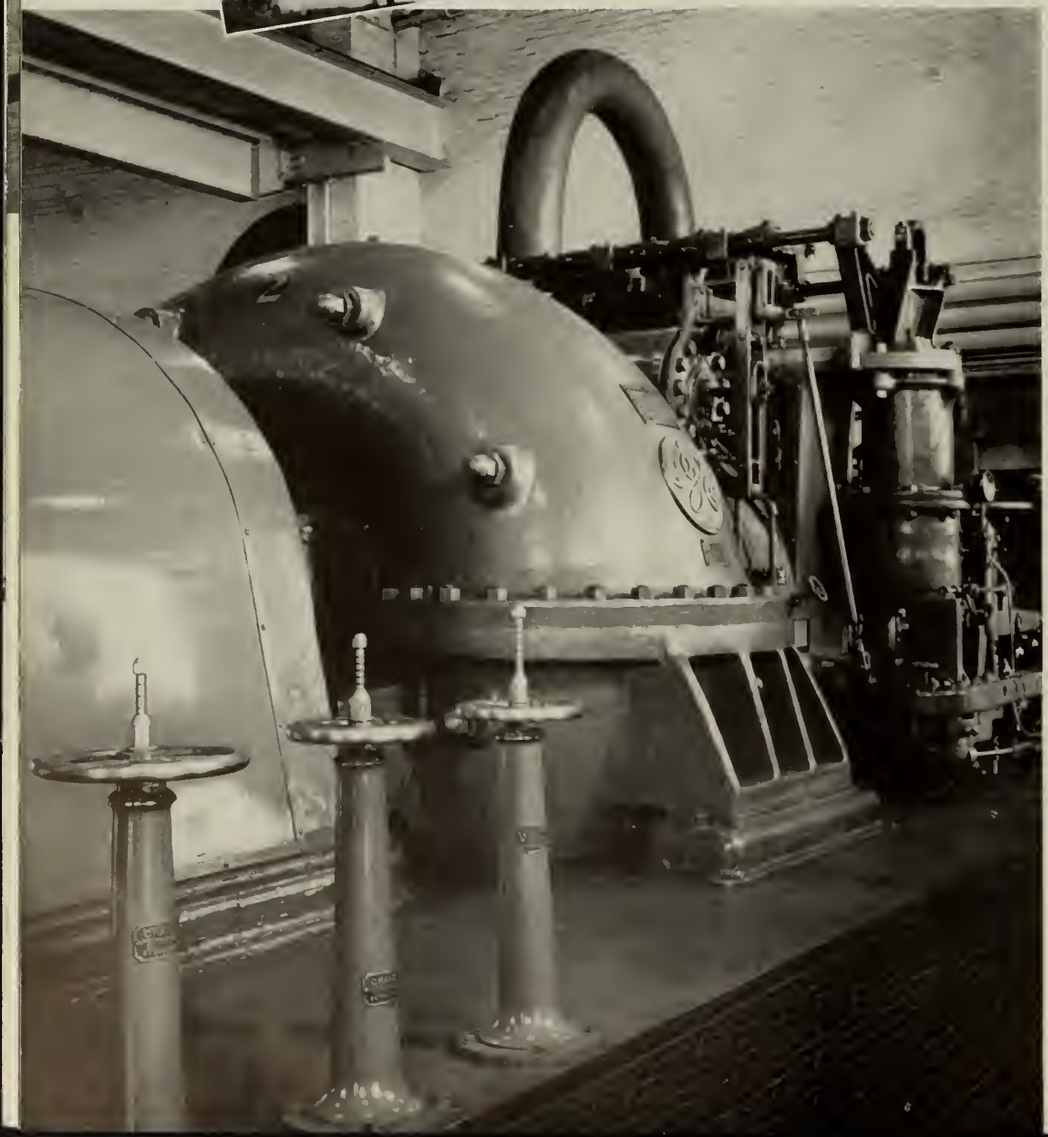
The "Know How" to do precise mechanical work

Partial view of the shops as seen from the south bank of the Mumford River.

Administration building (with flags) anchors the line of plant buildings extending west beyond range of the camera.

A cordial welcome awaits you within these doors.

Narrow gauge cars, hauled by an electric engine, shuttle coal from the yards to the power plant.



A 3,000 KW turbo-generator in our power plant — one of three units required to meet the power demand of the shops.

A crane dumps its load of coal into a waiting car for transportation to the hungry boilers of the power house.

Our modern Diesel-Electric locomotive hauls standard freight cars loaded with Whitin products to the near-by freight yards. (Average peace-time week — 400,000 pounds of freight.)

The foundry has a daily capacity exceeding 150 tons. This view shows only a small section where hand-pouring of small castings is done.

The last word in foundry procedure — within this semi-automatic unit molding, pouring, cooling, dumping, and shaking-out are performed in accordance with a carefully controlled cycle.

The manufacture of textile machinery involves the use of great quantities of iron castings of infinite sizes and shapes.

Whitin's large foundry is a busy and interesting part of the shop in peace time. With the additional requirements of war work, the skilled foundrymen, molders, and coremakers put forth their best efforts in meeting the increased production schedule that became necessary.

Conversion

This war, like all wars, has brought about great upheavals. It has drastically altered the lives of millions of people. Its effects are felt in varying degrees in every corner of the world. The complexities of modern warfare reach into the lives of individuals and into industry itself. To all, it brings *change*.

When war is thrust upon a nation savagely — unexpectedly — as it was upon ours, its chances of survival depend very largely upon how rapidly its people and its industries can make the change from peace to a war-time economy . . . how rapidly it can convert from the production of peacetime goods to the weapons of war.

In the next few scenes we have tried to depict in a small way the *spirit* and act of conversion which took place here. No photograph can record the days of planning and calculating . . . the solving of the many complex problems that are created in the course of converting a great textile machinery plant into one link in the chain of arsenals that developed over the length and breadth of our land.

The gaps left in our ranks by the 1565 who left to join the armed services of their country were filled, in many cases, by their wives, mothers, or sisters.

Winding Magneto coils — a natural for women's nimble fingers.

Mrs. John W. Lasell, Women's Personnel Director, interviewing an applicant for a war job.

The feminine touch is not confined to bench work.

For War: Steam engines for Liberty ships.

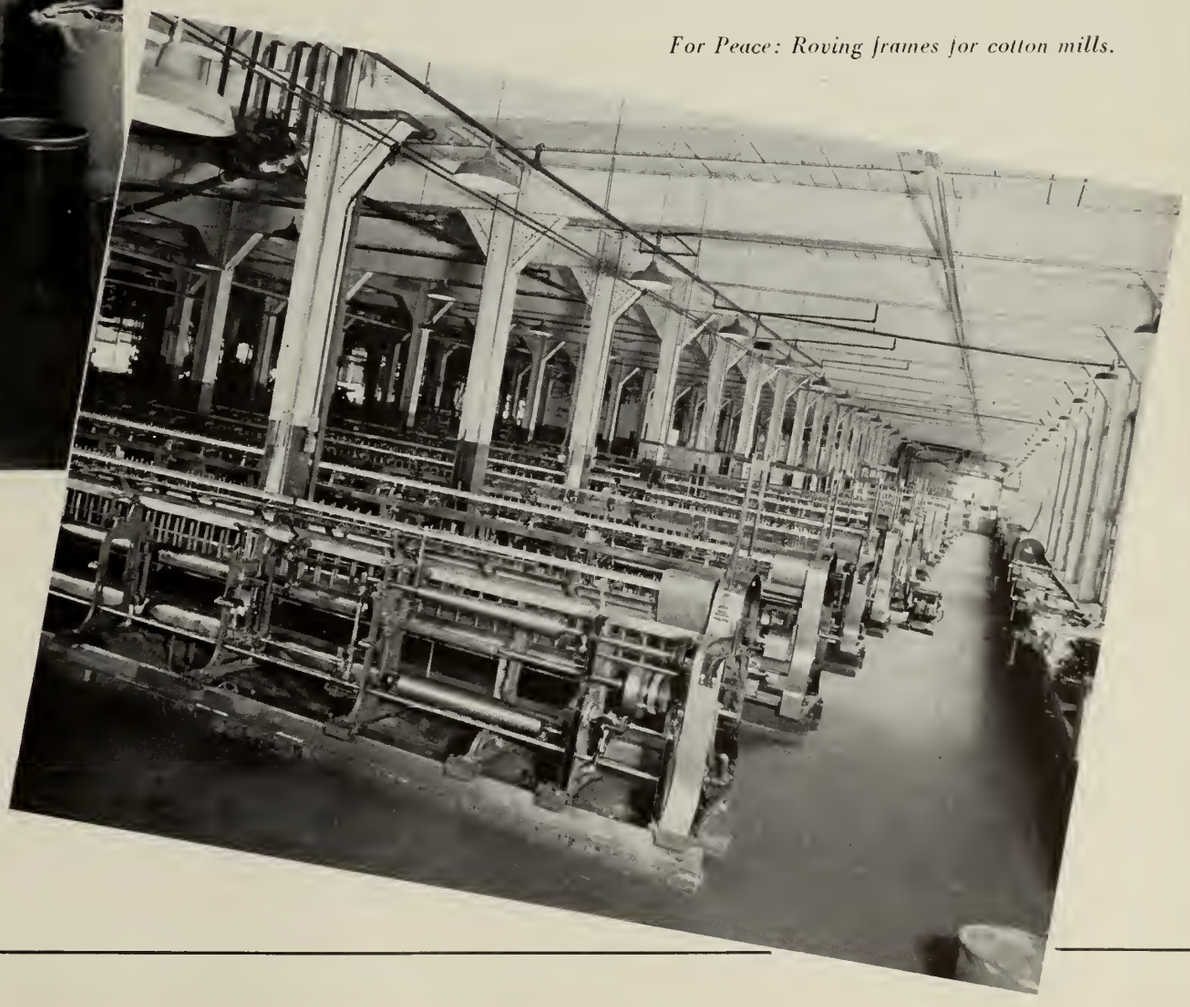
Conversion of floor space became necessary as we took on large orders for such war products as steam engines. The assembling and testing of steam engines being quite different from that of textile machinery it was necessary to install assembly lines and test stands complete with steam supply and testing and recording devices.

In all cases where it could be accomplished efficiently the component parts of the finished product were machined in our regular productive departments and were then routed to the floor where final assembly took place.

Shortage of materials, the restrictions of the priority system, and our policy of devoting a large proportion of our machinery and manpower to direct war work resulted in a substantial curtailment of our textile machinery production. In consequence, some of the large floor areas used for the assembling of textile equipment became available, in part at least, for the assembling of war products. In such cases the conversion could be made without the necessity of relocating large numbers of machine tools. In other instances, however, conditions demanded the moving of entire productive departments.

In one way or another, many thousands of square feet of floor space in the plant were converted for the use of direct war jobs.

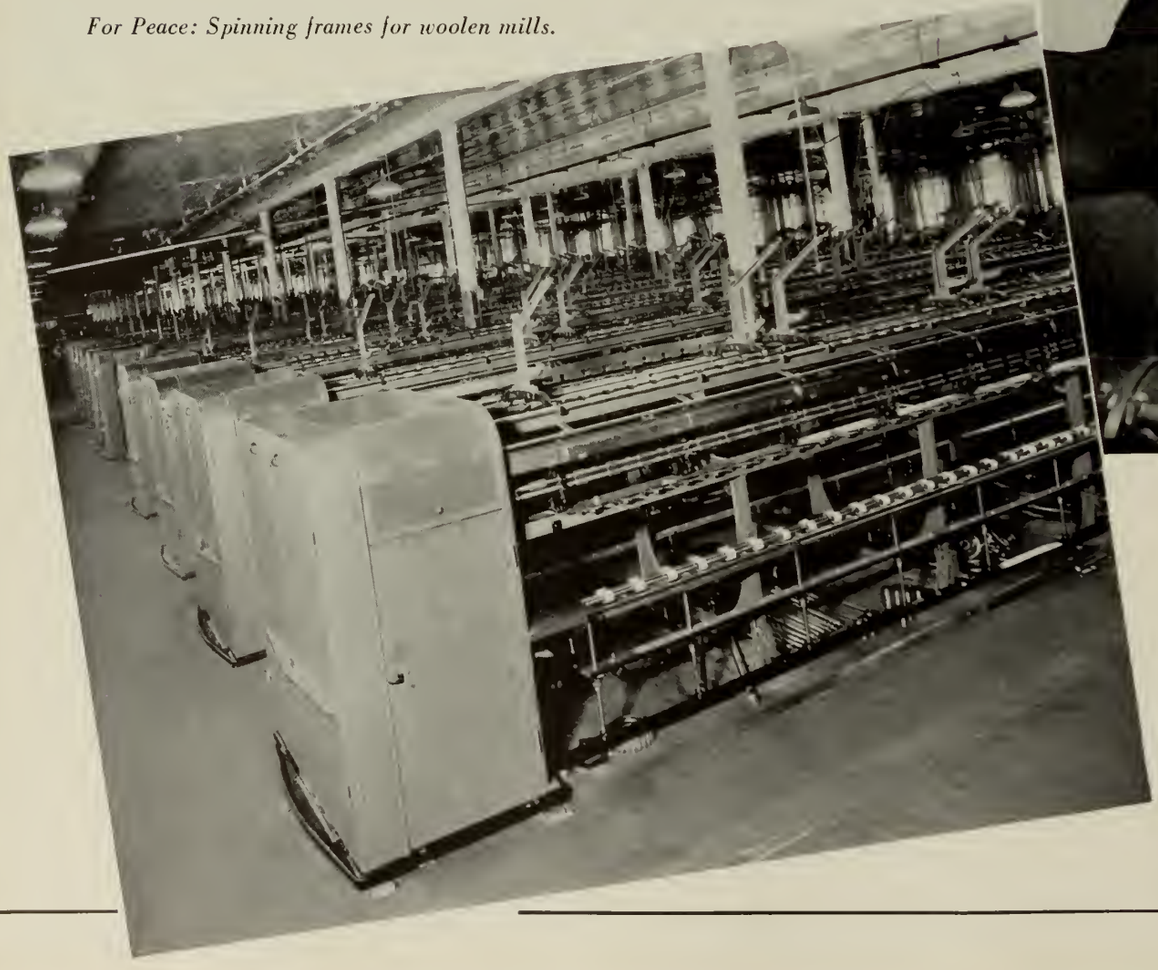
For Peace: Roving frames for cotton mills.



Conversion of floor space for the magneto program alone involved the removal of machinery and installation of new equipment in a floor space of 56,000 square feet. This figure is exclusive of operations performed for the magneto department in the standard productive departments of the plant.

The task of manufacturing, in quantity, completed magnetos for aircraft engines is such that no half-way measures will do. Our magneto program was of sufficient magnitude to require its own office staff and its own purchasing, inspection, and production-control departments. It became a plant *within* a plant. In preparing for the installation of new machine tools and other equipment for manufacturing magnetos, an area of more than an acre all on one floor was completely cleared of machinery and repainted. New lighting and wiring were installed.

For Peace: Spinning frames for woolen mills.



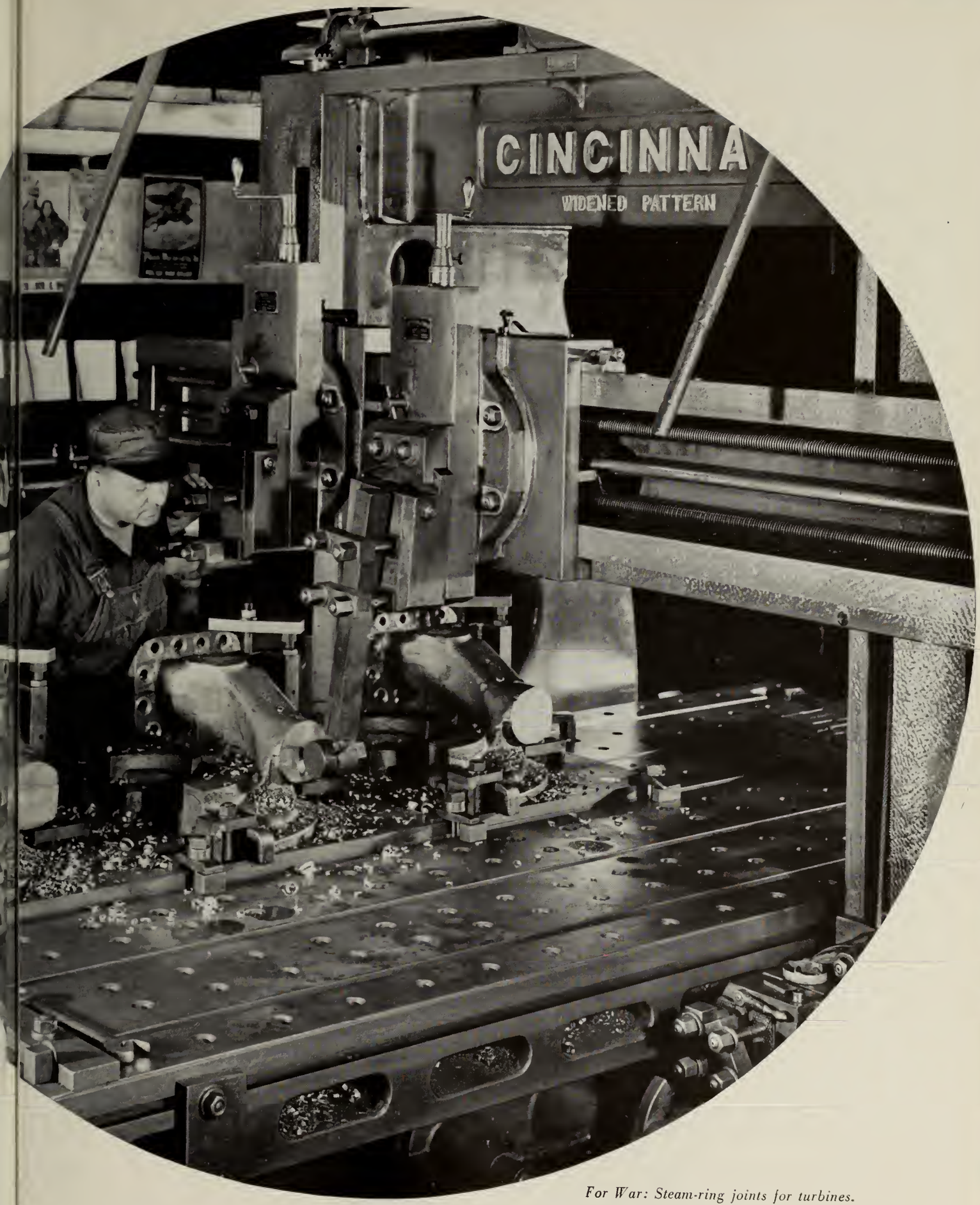
For War: The floor where spinning frames and twisters (left) were erected became a beehive of activity pouring out thousands upon thousands of magnetos for airplane engines.

This area became the main floor of the magneto department, and where spinning frames and twisters were formerly erected, thousands of aircraft magnetos pass through the smoothly flowing lines where machining, assembling, and testing are performed.

For Peace: Side frames for cards.

Conversion of machinery was accomplished sometimes with comparative ease, sometimes only after exercising the greatest amount of ingenuity.

In the beginning, contracts were chosen on the basis of our being able to make the best possible use of our machine-tool equipment. Later, as the requirements of our armed forces became more urgent and new machine tools became more readily available, we added to our existing equipment and took on even more diversified products.



For War: Steam-ring joints for turbines.

Crated steam engines are loaded into a box-car for transportation to a shipyard where they will be installed in Liberty ships to drive generators, forced-draft blowers, or pumps.

In normal times — Textile machinery for mills all over the world.


Production

For the Maritime Commission

STEAM ENGINES

★

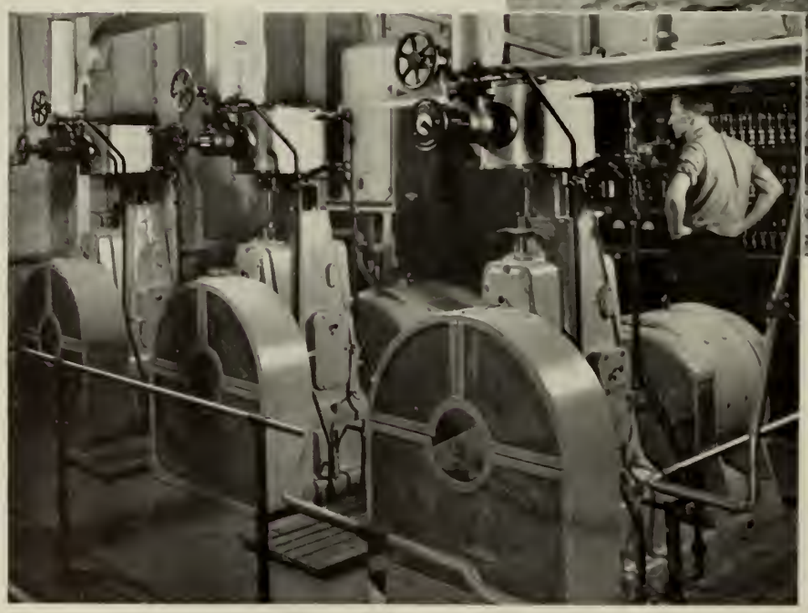
TURBINES

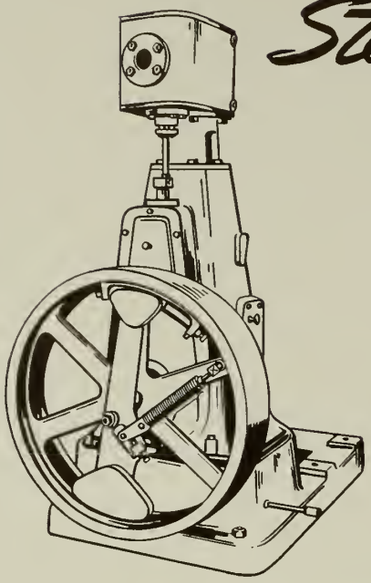
★

BLEEDER PLUGS and FLANGES

★

OIL PUMPS





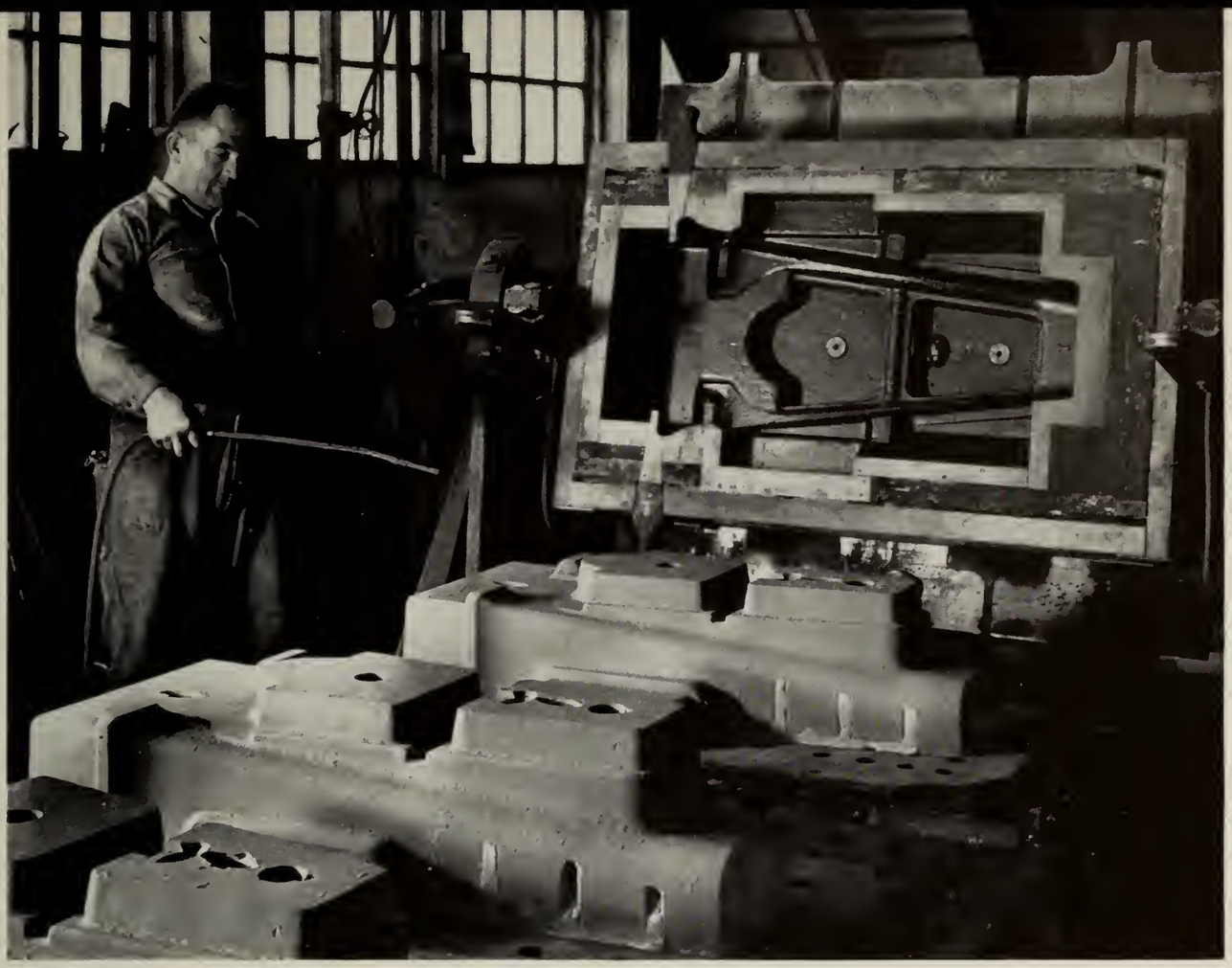
Steam Engines

World War II is truly a global war. Men are fighting on snow-capped mountains and in steaming jungles.

To get those men to their distant battle fronts, to keep them supplied and reinforced, requires — more than anything else — ships. And ships mean hulls, and superstructures, and many many other things including auxiliary engines — engines to drive pumps, forced-draft blowers, and generators. These are the reasons for the Whitin Victory Engine.

Start of the steam engine was at the drafting board. Of special design, the engine had to be built to accommodate the space limitations of ships already under construction.

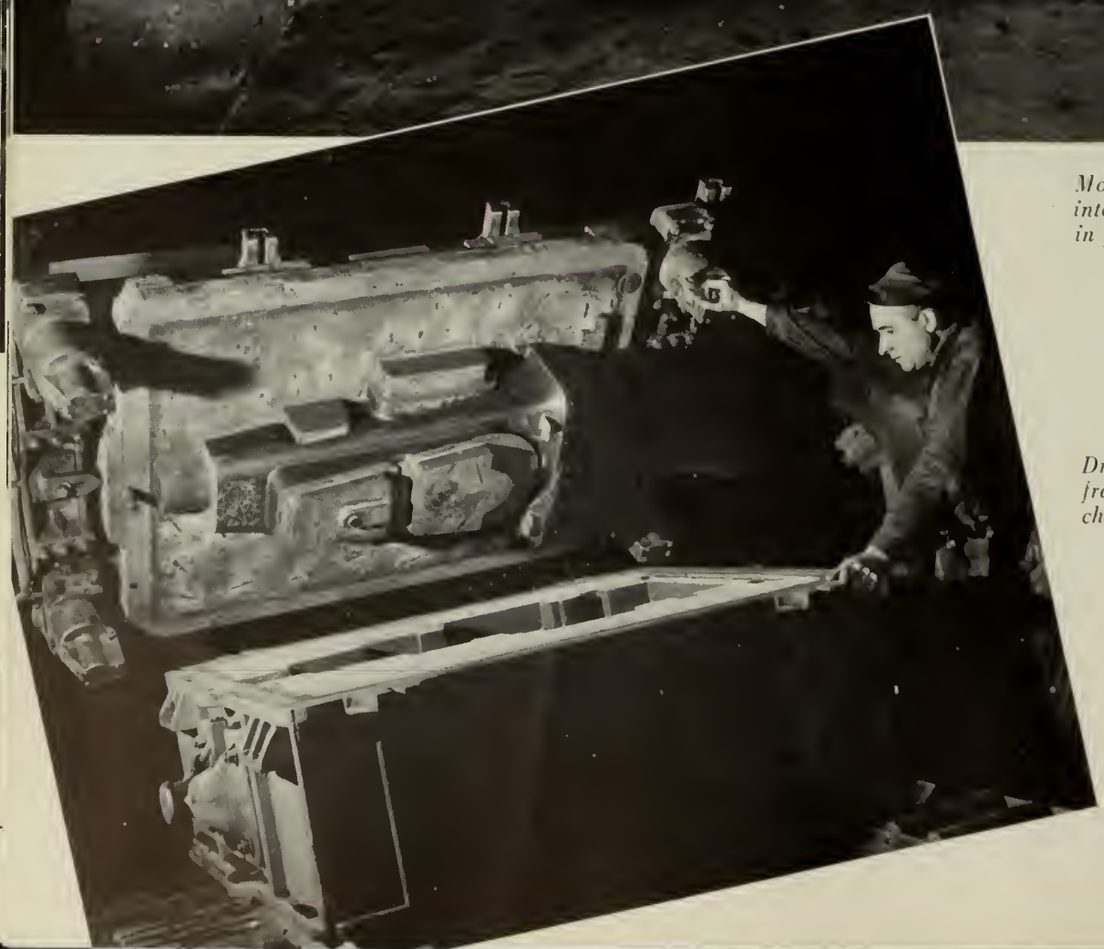
Artists of industry are these pattern makers who are fashioning the core boxes for the engine frame.



After the cores have been molded, excess sand is blown off with an air hose.

Here the cores are wheeled into an oven for a baking period that will harden them in preparation for pouring of the base.

Molten iron flows from the crucibles into the finished mold which is shown in preparation below.



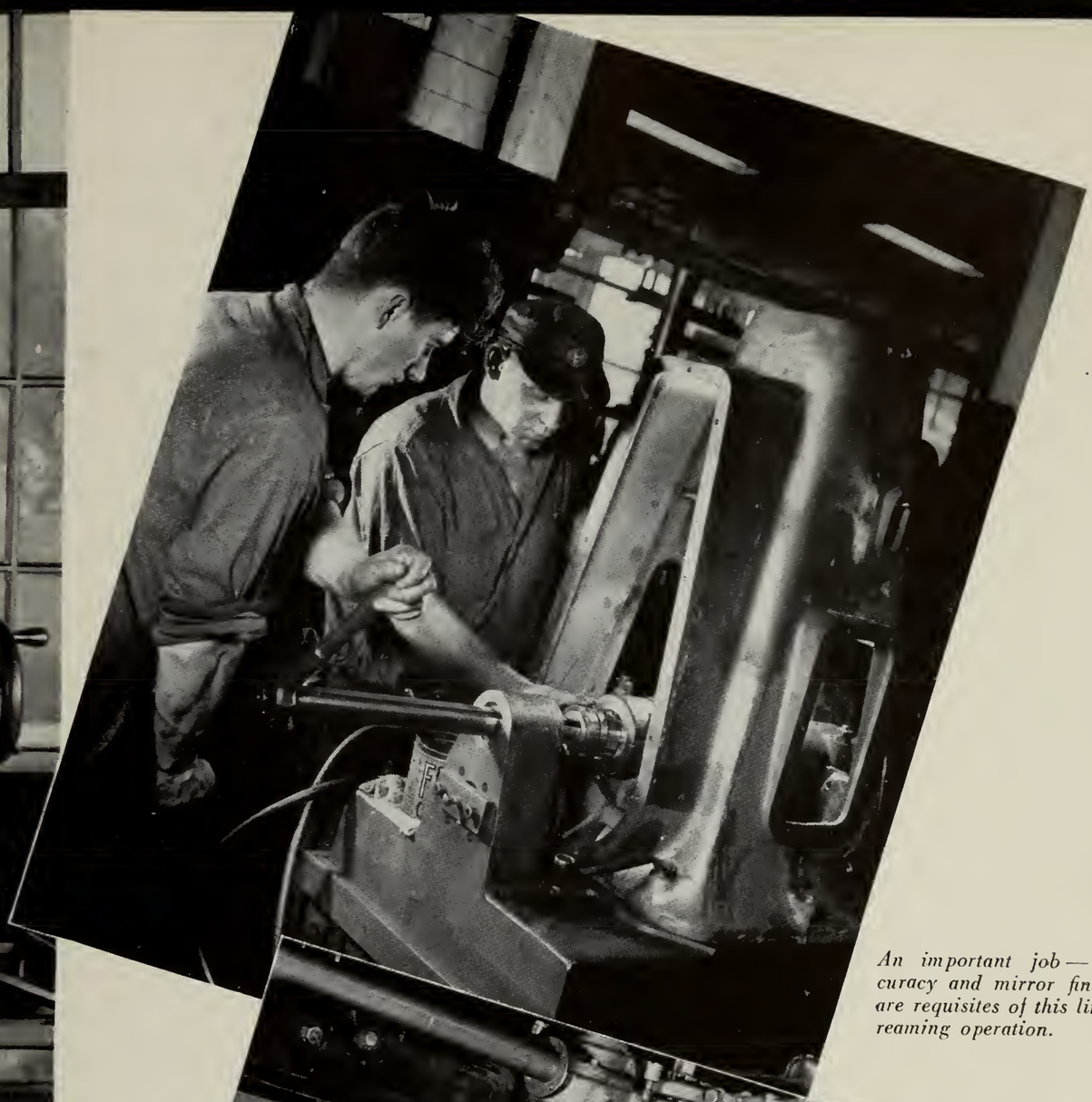
Drawing the pattern of the engine frame on the roll-over molding machines.

After pouring, the casting is snagged with a portable grinding wheel to remove rough edges.

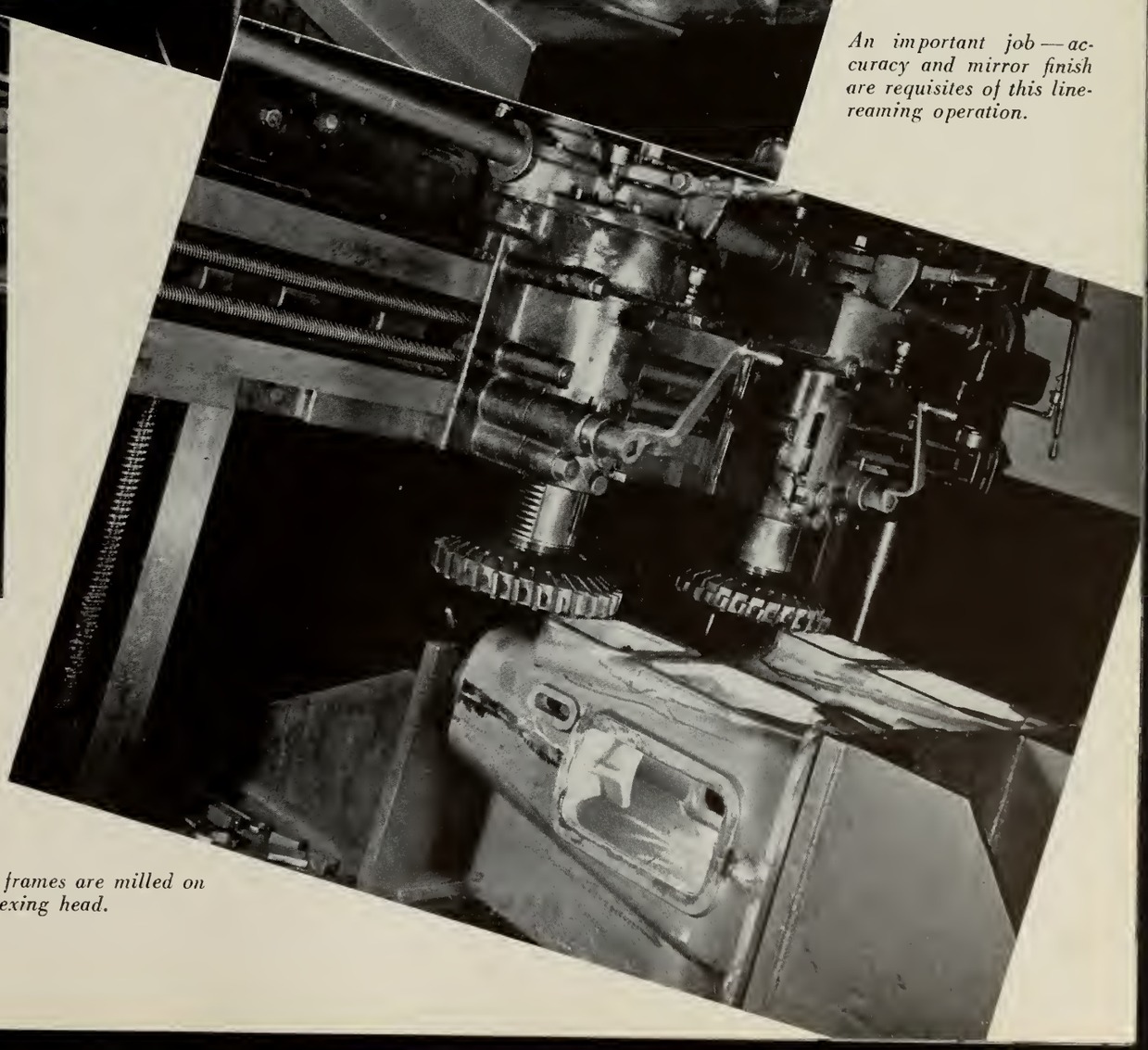
Partially machined frame castings await further processing before assembly.

On an engine lathe, the ends of the casting are squared and cut to correct length.

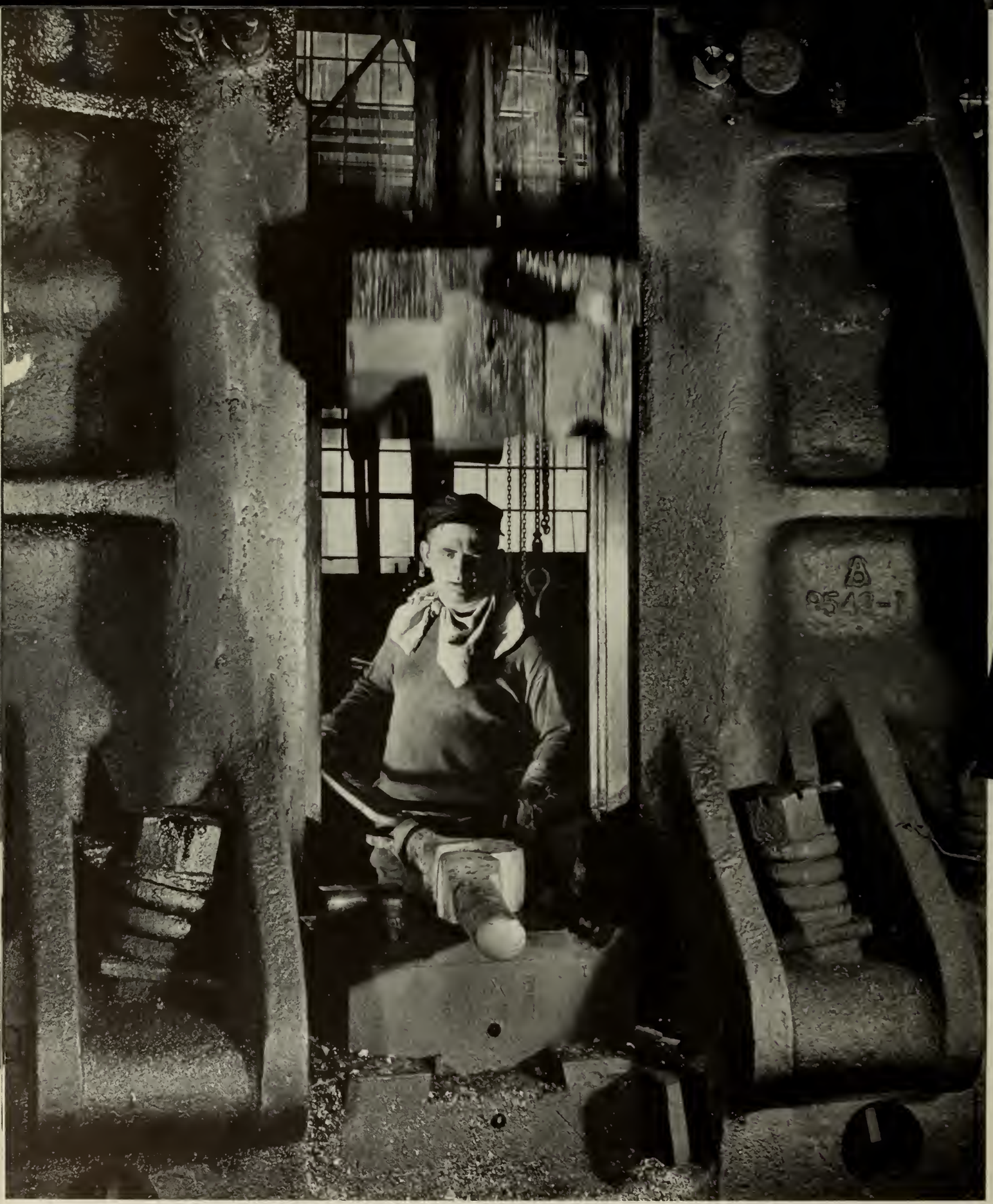
Manufacture of steam engines began in the summer of 1941 when we, as subcontractors to the B. F. Sturtevant Co., accepted an order for 312 pump engines. Before this order had been completed, we had been asked by the U. S. Maritime Commission to produce an entirely new engine having a 6″ bore and 7″ stroke.



An important job — accuracy and mirror finish are requisites of this line-reaming operation.



Sides of the frames are milled on a double-indexing head.



On this 2500-lb. steam hammer, the crankshafts are forged from a solid billet to their rough form.

Accuracy of his work in turning the connecting-rod bearing is checked by this experienced operator using his micrometer.

The size of the program assigned to us by the Maritime Commission far exceeded any quantity we had anticipated six months before, so that we experienced a tremendous expansion of pattern equipment, tools, jigs, fixtures, and assembling and testing facilities.

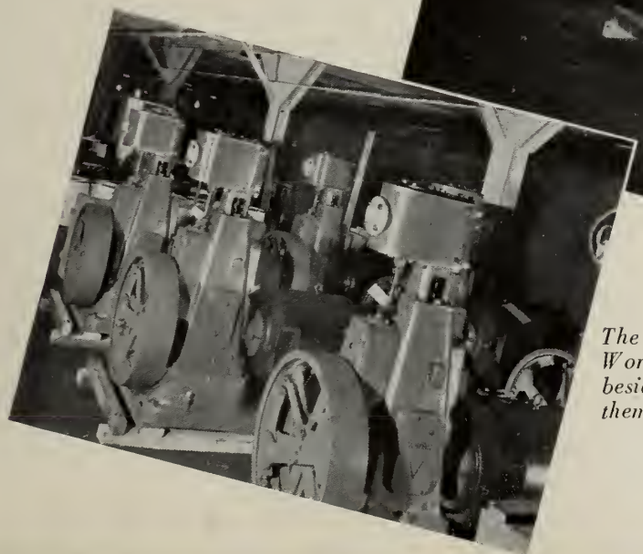
From a delivery rate of 15 engines per month in September 1941, our production rose rapidly until we reached a schedule of 161 engines per week and finally completed nearly 11,000 for the cargo ships of our great Victory Fleet.

A section of the line where the scores of precisely machined parts are assembled to make the Whitin Victory Engine.

In the early stages of assembly, crankshafts are fitted to the already assembled base and frame.

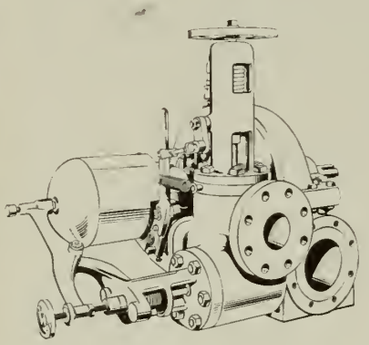
Before leaving our plant, every engine, coupled to the generator which it will drive, is subjected to rigorous test runs.

Whitin Victory Engines also drive forced-draft blowers in the Liberty ships carrying munitions and supplies to our fighting men all over the world.



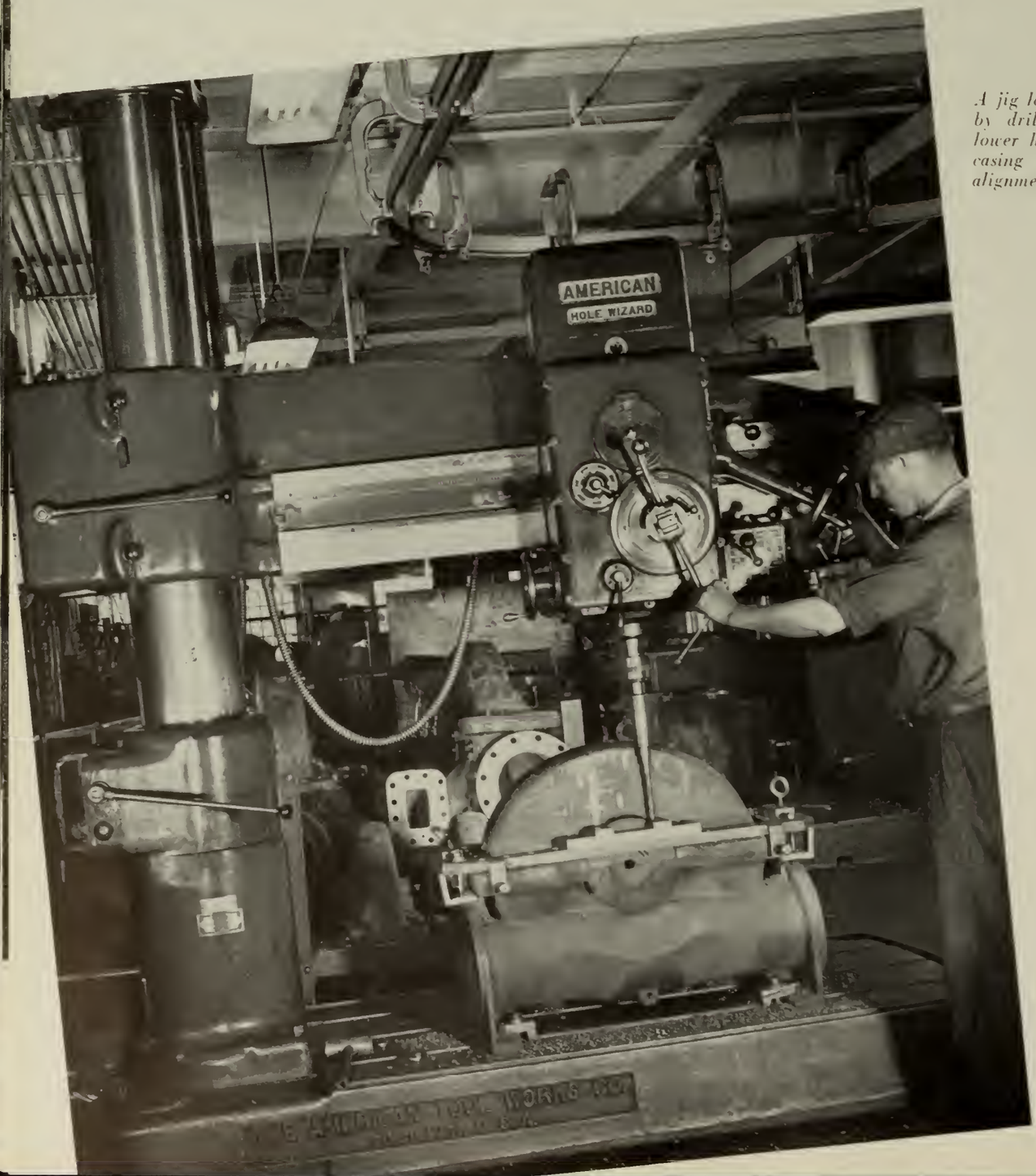
The end of the line at Whitin Machine Works . . . Victory Engines line up beside the freight cars which will take them to the shipyard.

Turbines



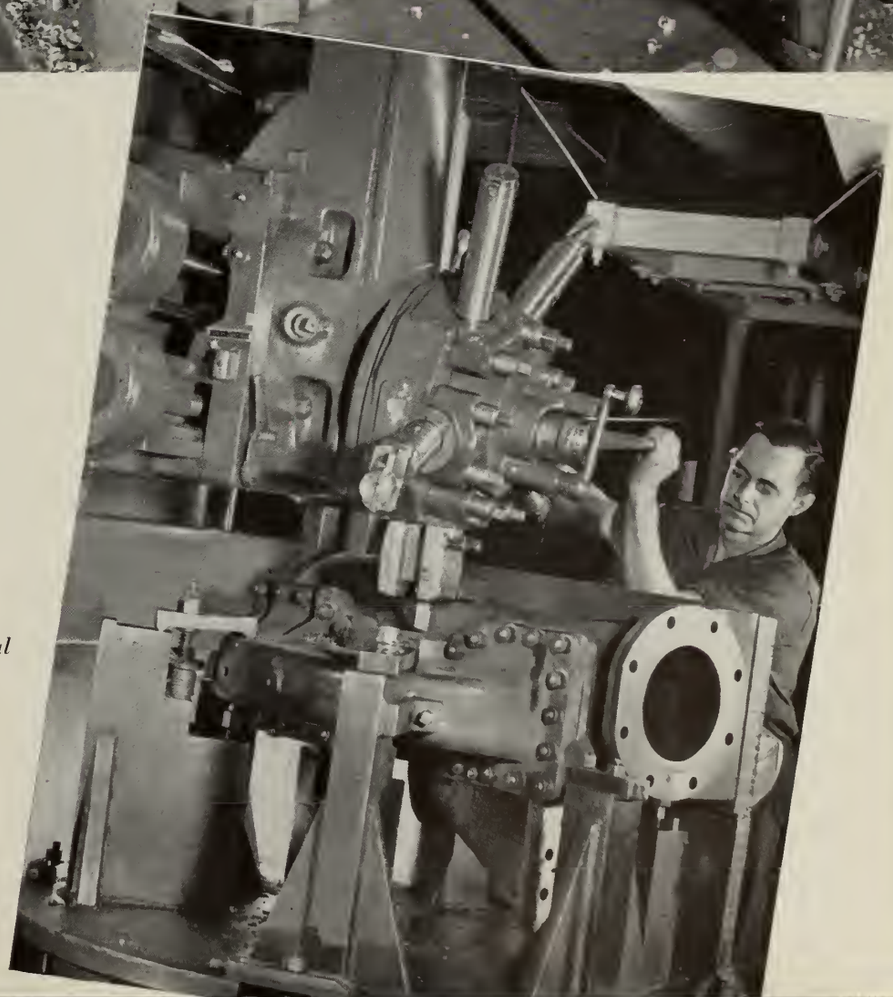
The tremendous expansion of the shipbuilding program placed an unprecedented load upon the manufacturers of turbines. Although there is little similarity between a turbine and a textile machine, a careful study of the drawings revealed that our equipment could be adapted to this work, so that we were able to accept an order as subcontractors to the General Electric Company.

In addition to their uses on tankers and cargo ships, these turbines were required for the high-octane gasoline refineries and synthetic rubber plants.



A jig locates the holes, and, by drilling the upper and lower halves of the turbine casing together, perfect alignment is secured.

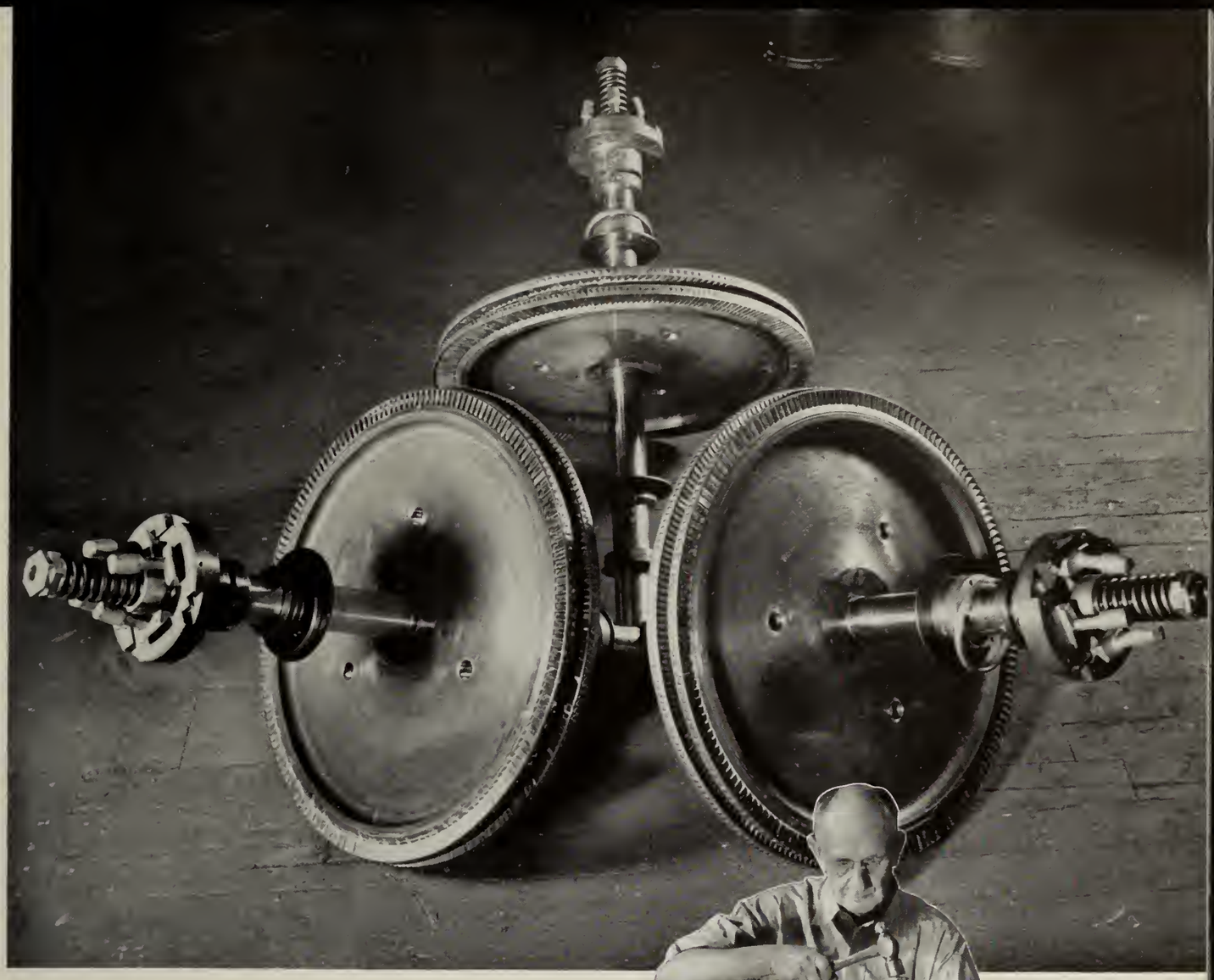
Strapped to the planer table are two lines of lower-half casings. The horizontal joints are being planed on both lines.



The packing-box joint is faced on a vertical boring mill.

A special groove held to close tolerances is cut in the bucket-wheel to permit insertion of the buckets.

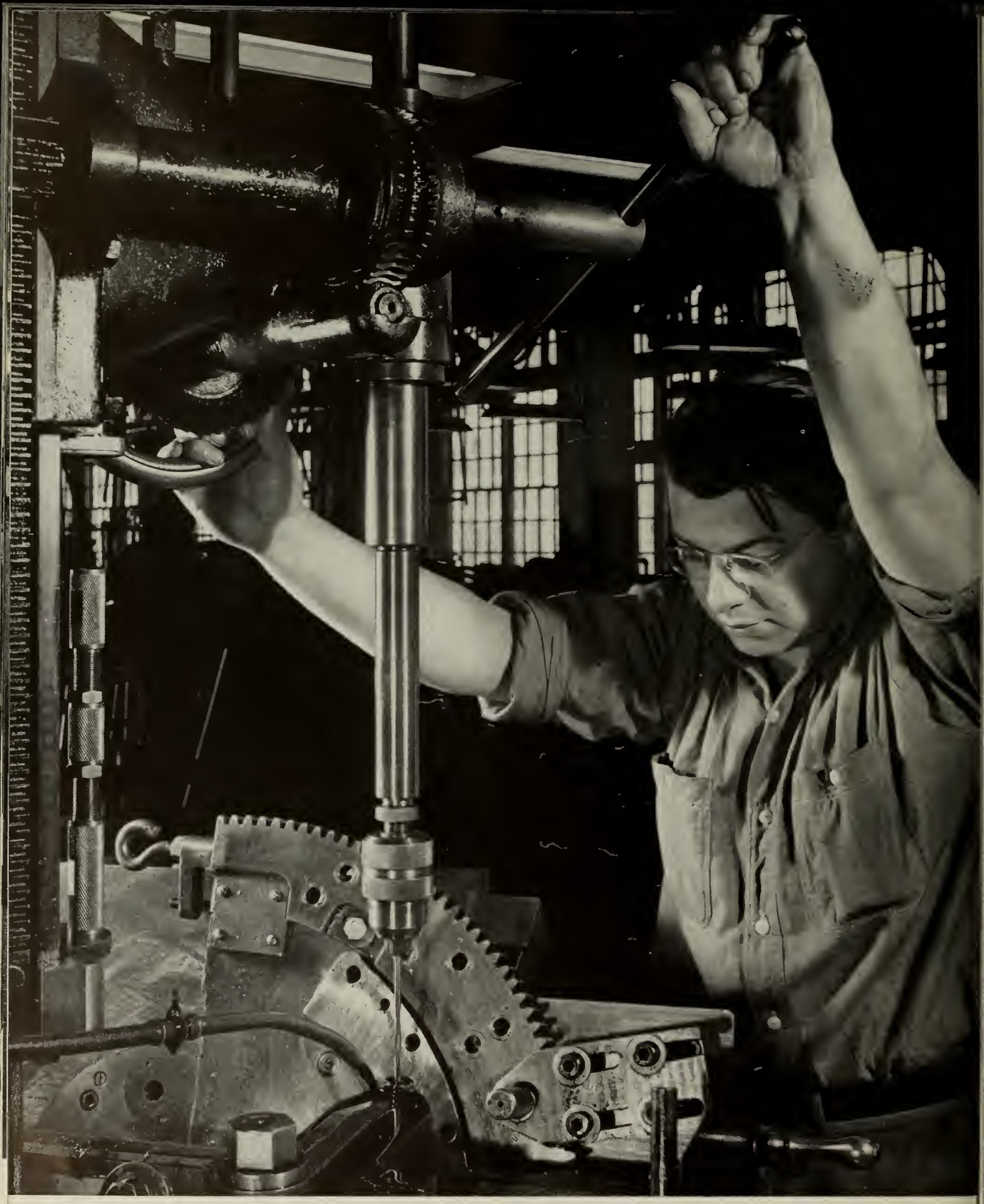
Buckets are inserted individually and driven into place.



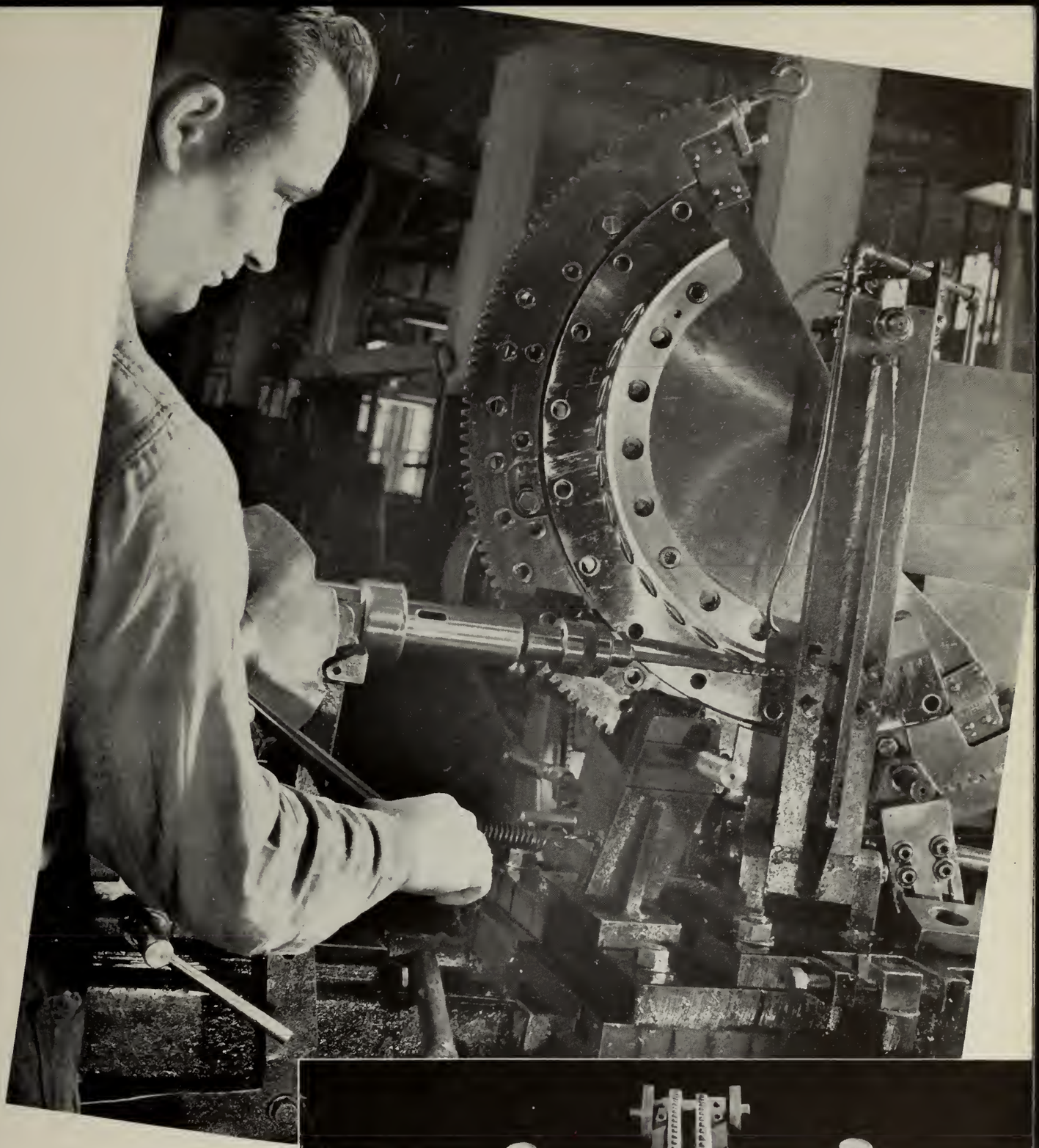
Ready for assembly in 50KW units are these three finished bucket wheels.

A steel band is placed around the buckets to lock them into position.

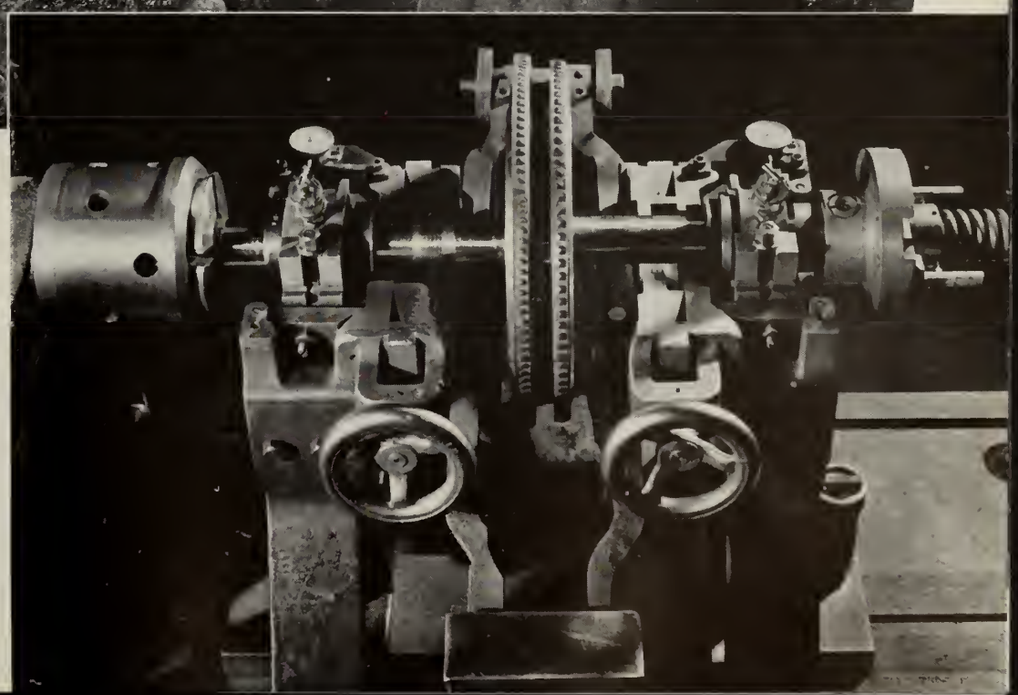
In addition to our subcontract orders from General Electric Company, we manufactured turbines on prime contracts issued by the U. S. Maritime Commission. In all, four types were produced, and in October 1943 we were delivering forty completed units weekly. Total production of turbines of all types was more than 2,500 units.



This operator is angle drilling the nozzle holes which lead the steam to the turbine buckets.



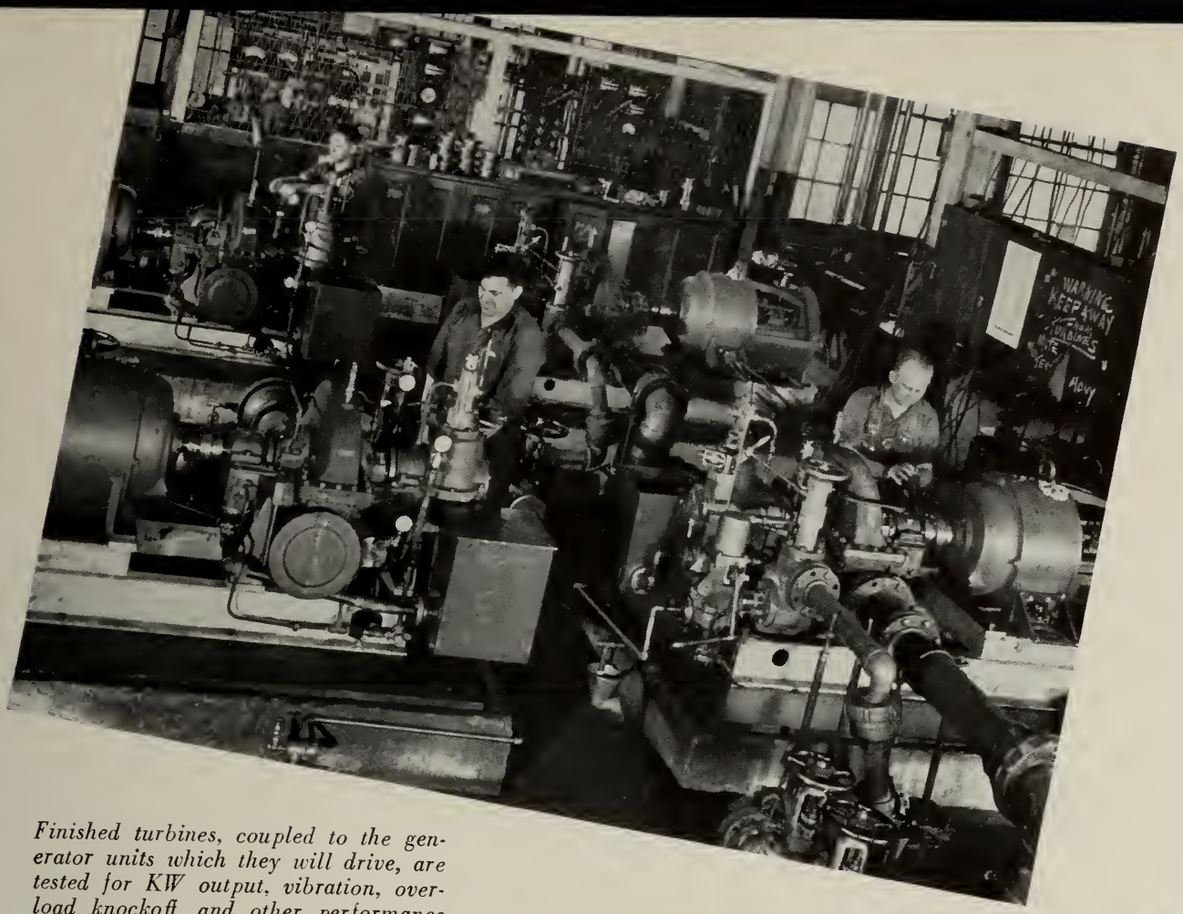
To insure smoothness and accuracy of size, the holes in the nozzle plate are reamed.



Bucket wheel assembly must have perfect balance. This specially designed machine indicates whether any tendency toward eccentricity is present.

General view of assembly floor showing two of three complete lines.

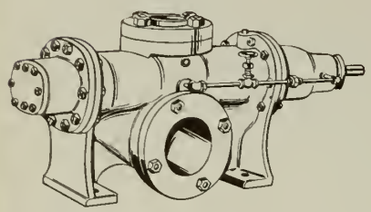
In preparation for the manufacture of turbines, a great deal of thought was put into the design of tools, jigs, and fixtures, of which there were more than 500, with the intention of securing a simplification of operations. Knowing that the supply of skilled labor was limited, careful planning to reduce the requirements in this line was more than ever important. The various styles of turbines which we contracted to deliver were composed of 1,350 parts, and the task of machining, assembling, and testing these units was not an easy one. Whitin workers may well feel proud of the assistance which they gave to the ship program and to the vital industries in which these units were employed.



Finished turbines, coupled to the generator units which they will drive, are tested for KW output, vibration, overload knockoff, and other performance characteristics.

Almost ready to drive generators, fuel pumps, or fans are these turbines in the final stages of assembly.

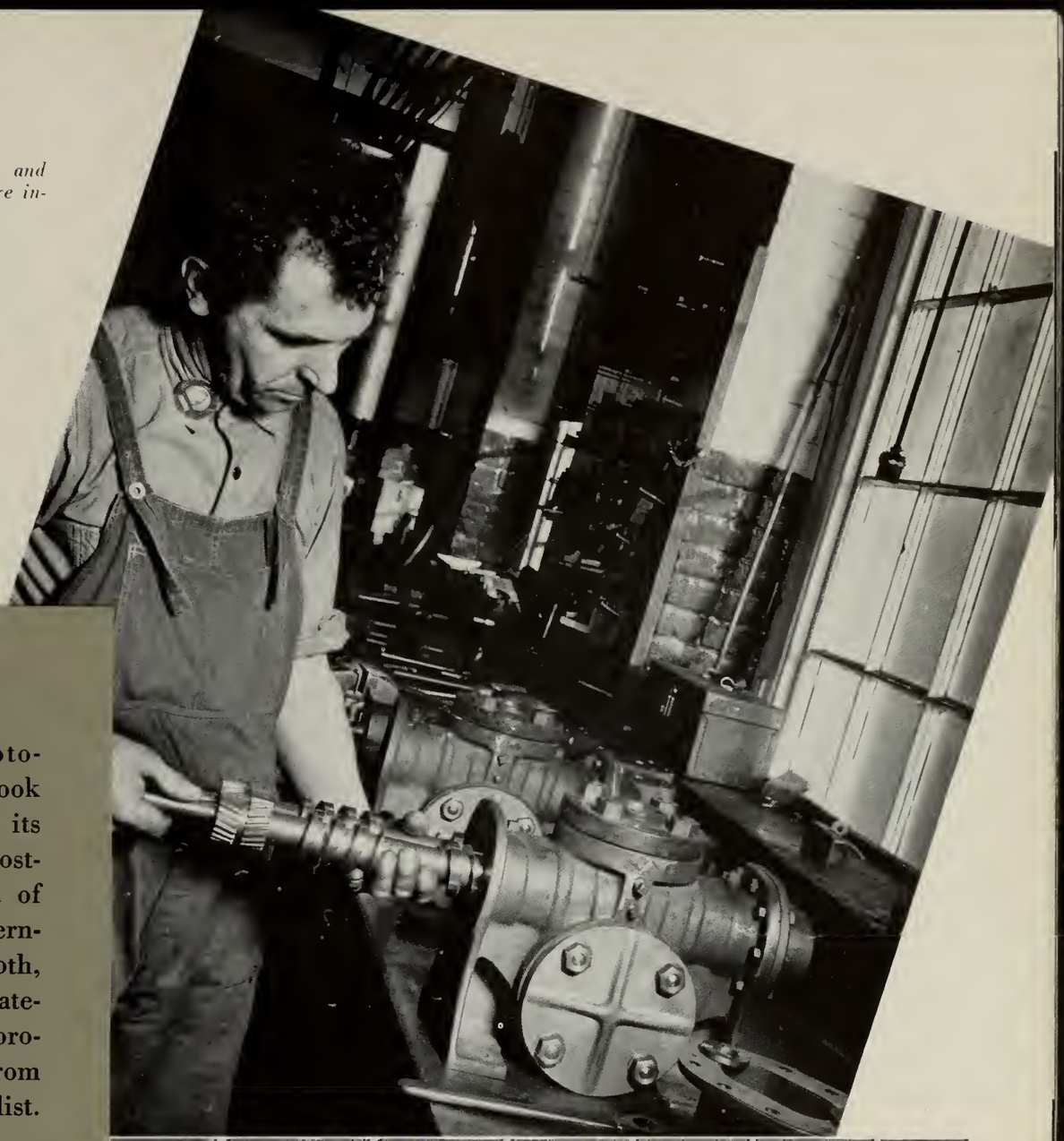
Quimby Pumps



Internal grinding of pump body insures smoothness of finish, true alignment, and dimensional accuracy.

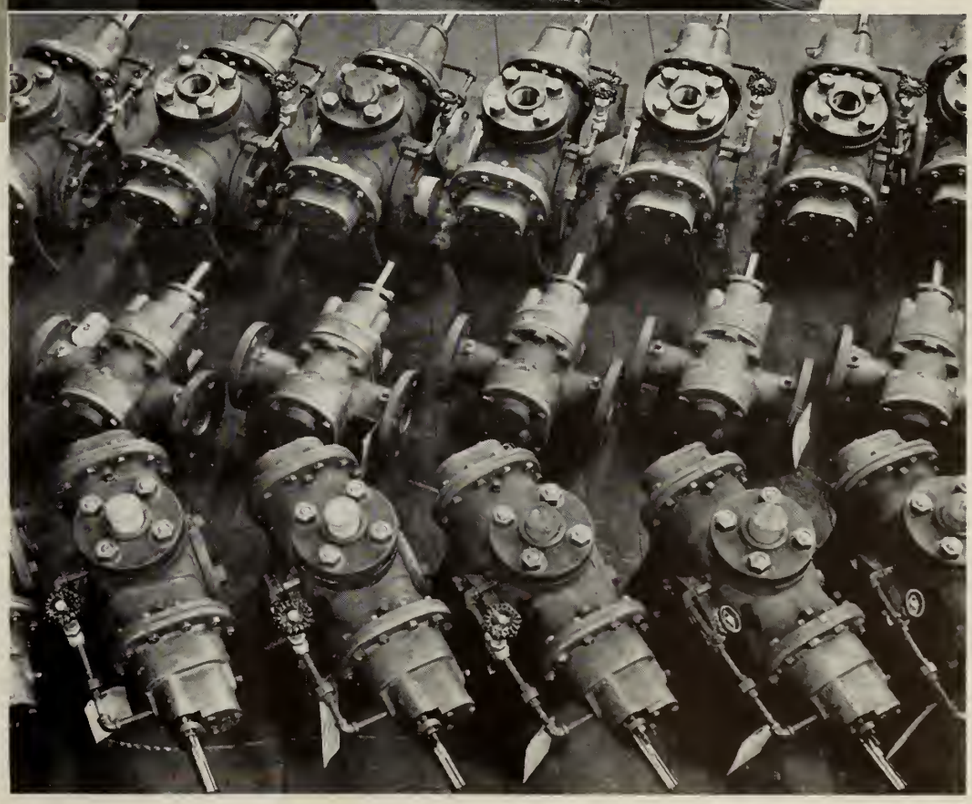
Further assistance in connection with the ship program was requested of us by the U. S. Maritime Commission, in August 1942. In this case, the demand was for three different types of oil pumps for Liberty ships and tankers. These pumps were of Quimby design, and three different types for pumping fuel and lubricating oil were manufactured here.

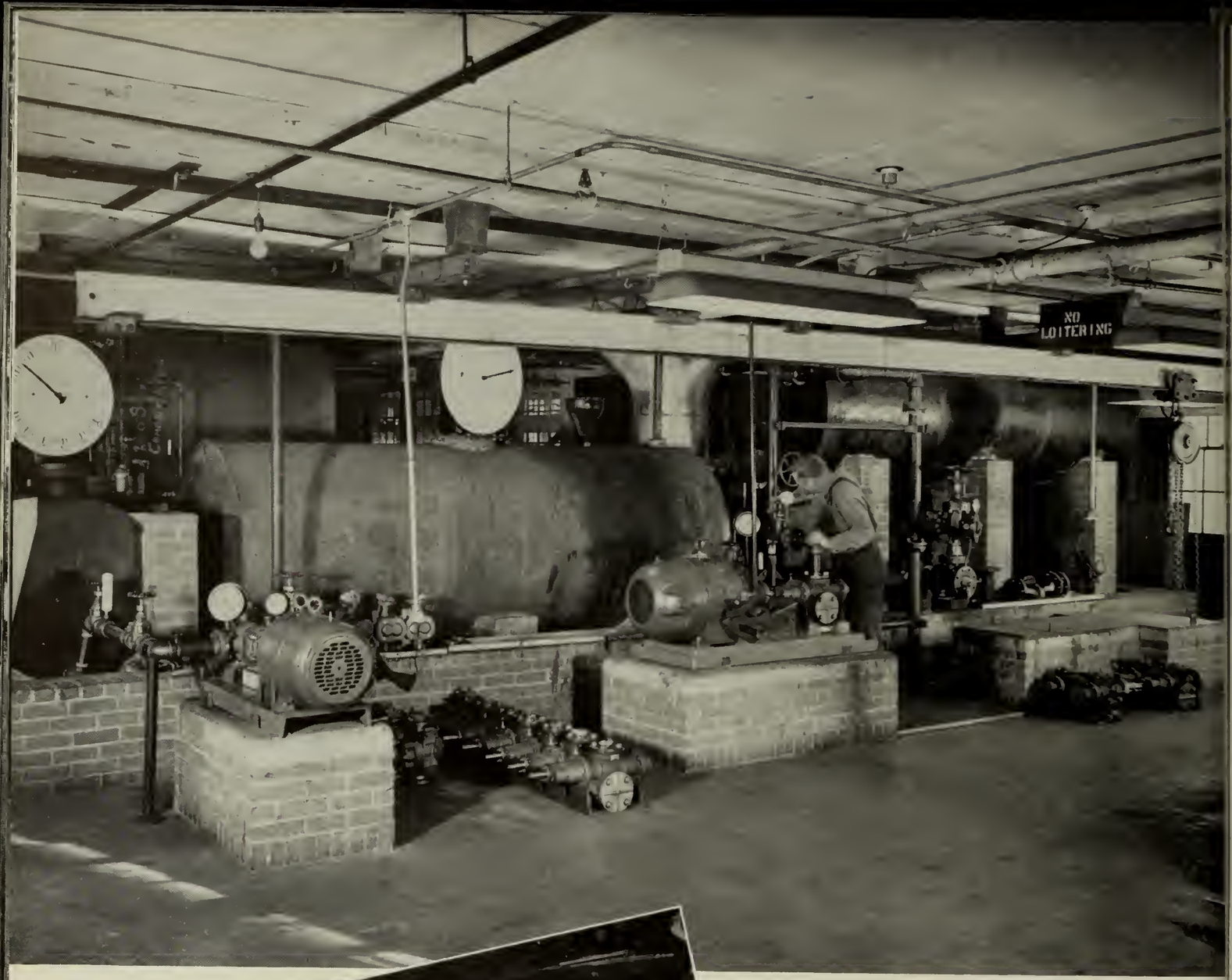
After aligning the screws and gears on the shafts. they are inserted into the pump body.



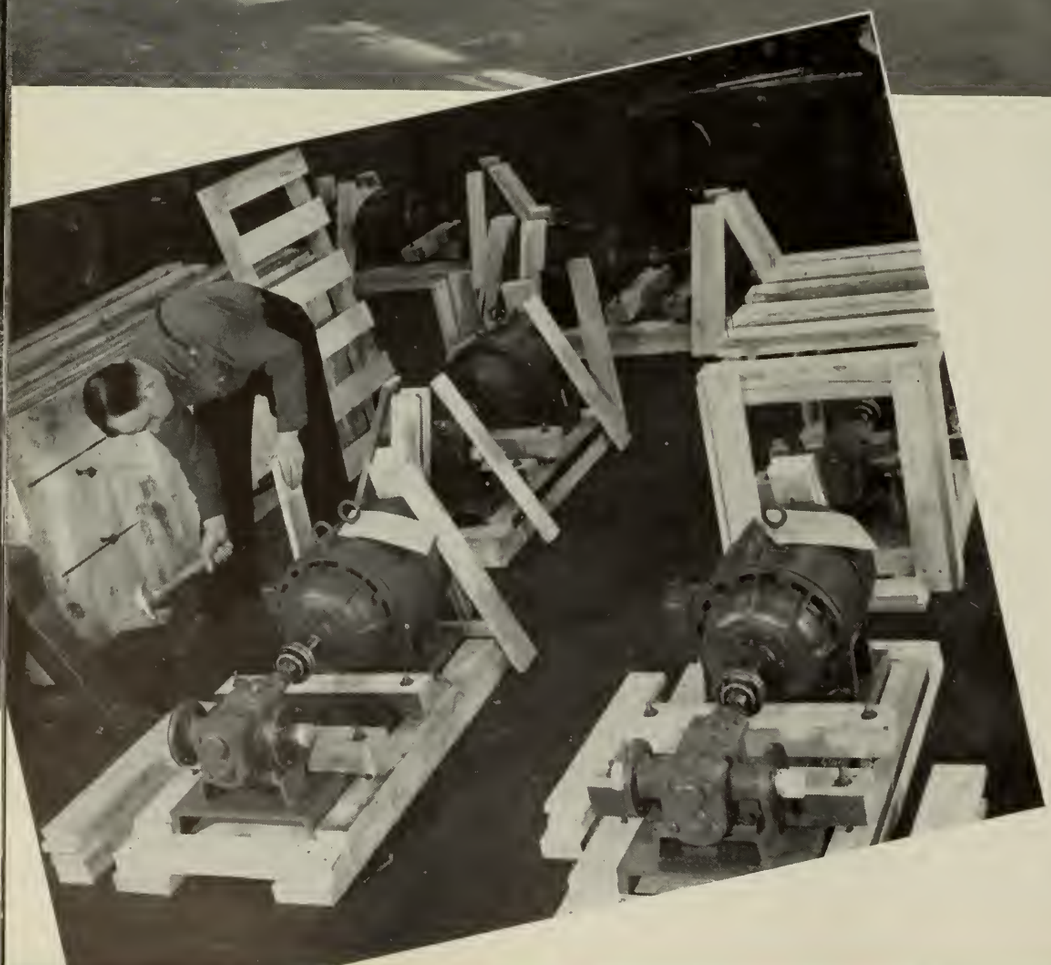
WHILE the photographs used in this book were taken in 1943, its actual production was postponed at the request of the United States Government until paper, cloth, engraving metal and materials necessary for its production were released from the critical shortage list.

Finished pumps for both fuel and lubricating oil await assembly to motor and base.



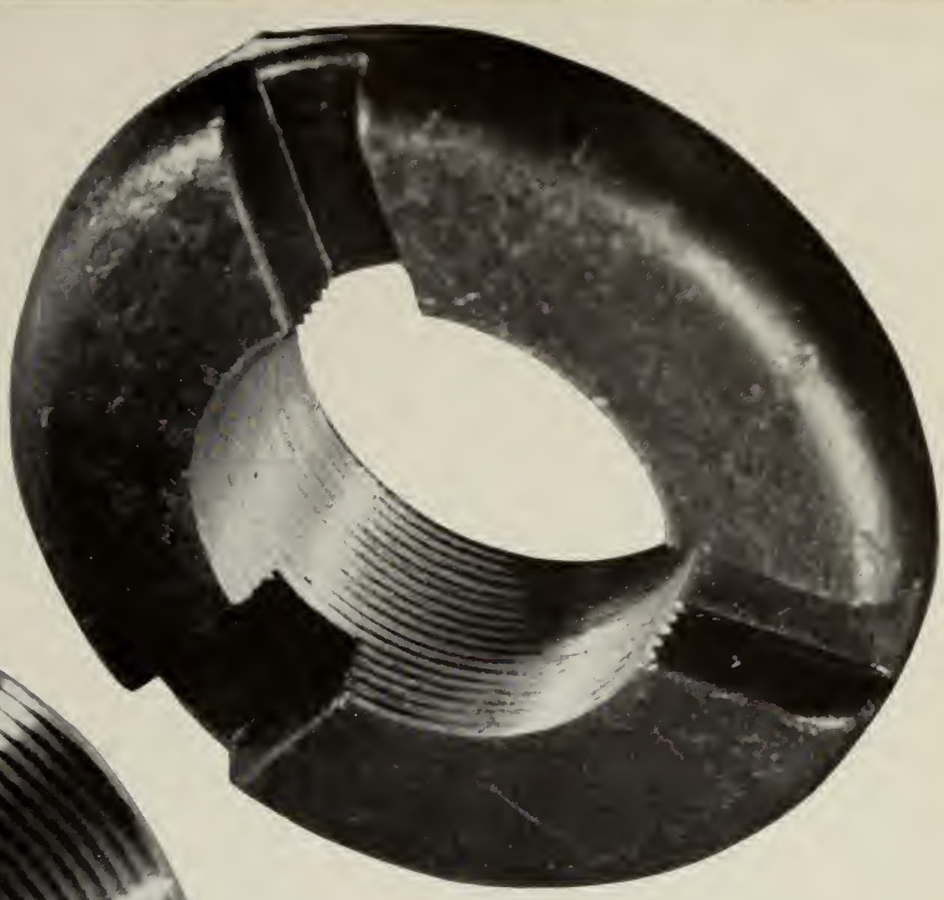


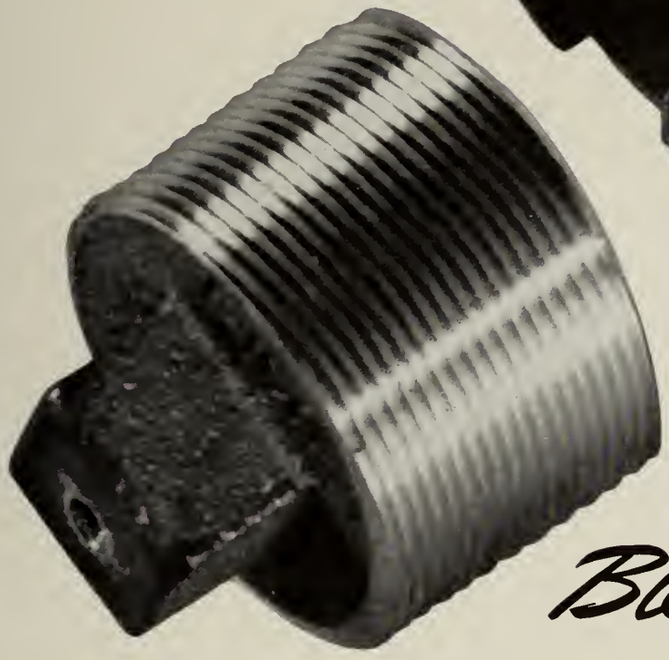
Before shipment, all pumps were tested under operating conditions to guarantee that they would meet capacity specifications.



Perhaps these pumps are now transferring oil from a tanker to one of our bases in the Pacific.

Looks simple, doesn't it? But, the U. S. Maritime Commission saw fit to honor us with special commendation for our production of bleeder plugs and flanges.





Mounting Flanges

Bleeder Plugs

Ships are made of many things. Among them are bleeder plug and flange assemblies. The Maritime Commission, desirous of finding a source that could furnish a constant supply of a uniformly good product, suggested that we go into production on these units.

The assembly consists of a threaded steel flange and a bronze or stainless-steel plug. While the customary method of making the flange is to start with a casting, we determined that forging would result in a superior product, and the samples which we submitted proved so satisfactory that we received special commendation from the Commission because of this innovation. A total of more than 70,000 units was delivered to our Victory Fleet.

General view of the platform as opening announcement was made at Maritime M Award Ceremony.

Holding the Maritime M Pennant are left to right: Charles E. Walsh, Jr., J. Hugh Bolton, E. Kent Swift, Governor Leverett Saltonstall. F. Eugene Banfield, Jr.

E. Kent Swift, ". . . In this quiet valley . . ."

Award of the Maritime "M"

On Saturday afternoon, November 7th, 1942, the United States Maritime Commission awarded to the employees of the Whitin Machine Works the coveted Maritime "M" Pennant, the Victory Fleet Flag, and Maritime Labor Merit Badges in recognition of outstanding production achievement on maritime contracts. Since that time, at six-month intervals, four stars have been added to the pennant for "continued outstanding production achievement."

The ceremonies, held on the spacious grounds of the old John C. Whitin estate which provided a natural amphitheatre for speakers' platform, orchestra, and seating arrangements, were witnessed by more than six thousand employees and guests.

"This hillside presents a mighty impressive sight, and a sight of which every citizen of Massachusetts is proud."—His Excellency, Governor Saltonstall.

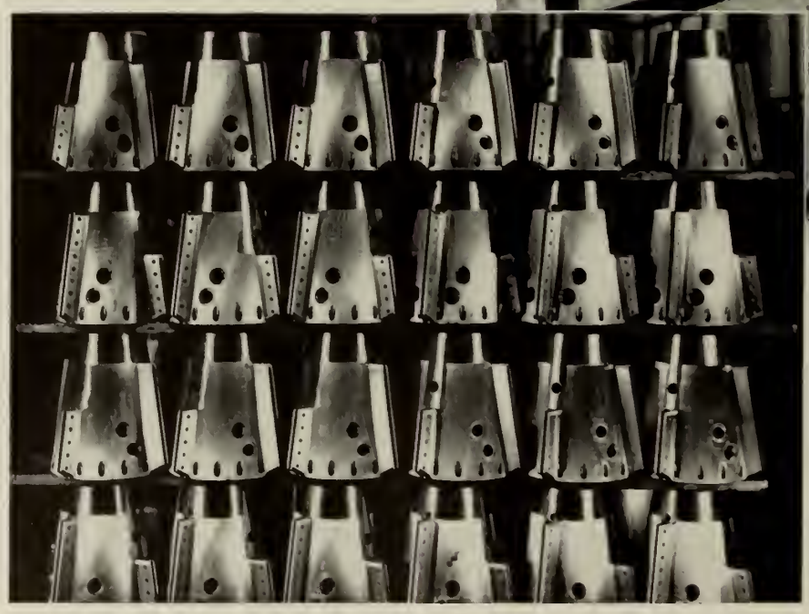
Charles E. Walsh, Jr., Chief of the Procurement Division, United States Maritime Commission, congratulates William T. Walsh (right) upon his 43-year service record with Whitin. Mr. Walsh represented Whitin's 4500 employees in receiving the Merit Badges.

For the Navy

TORPEDO PARTS

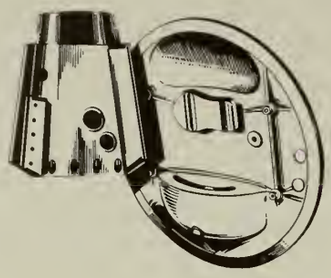
- ★ BULKHEADS
- ★ TAIL CONES
- ★ PROPELLER SHAFTS
- ★ "A" FRAMES

and approximately seventy-five
additional component parts.



The greatest care is exerted in loading these torpedoes aboard ship, not only because of the danger involved, but because the "tin fish" themselves are so valuable. Stuffed with intricate mechanisms, each tube costs thousands of dollars.

Torpedo Parts



Made with extreme care and precision, these parts are used but *once*. Components of the intricate mechanism in a naval torpedo, most of the items here pictured have undoubtedly been blown to pieces along with the enemy ships at which they were aimed.

Torpedo "A frames" are removed individually from the heating furnace and are quenched in oil to develop toughness and rigidity.

In the furnace A frames are brought to a predetermined temperature and allowed to "soak" for a carefully controlled period of time.

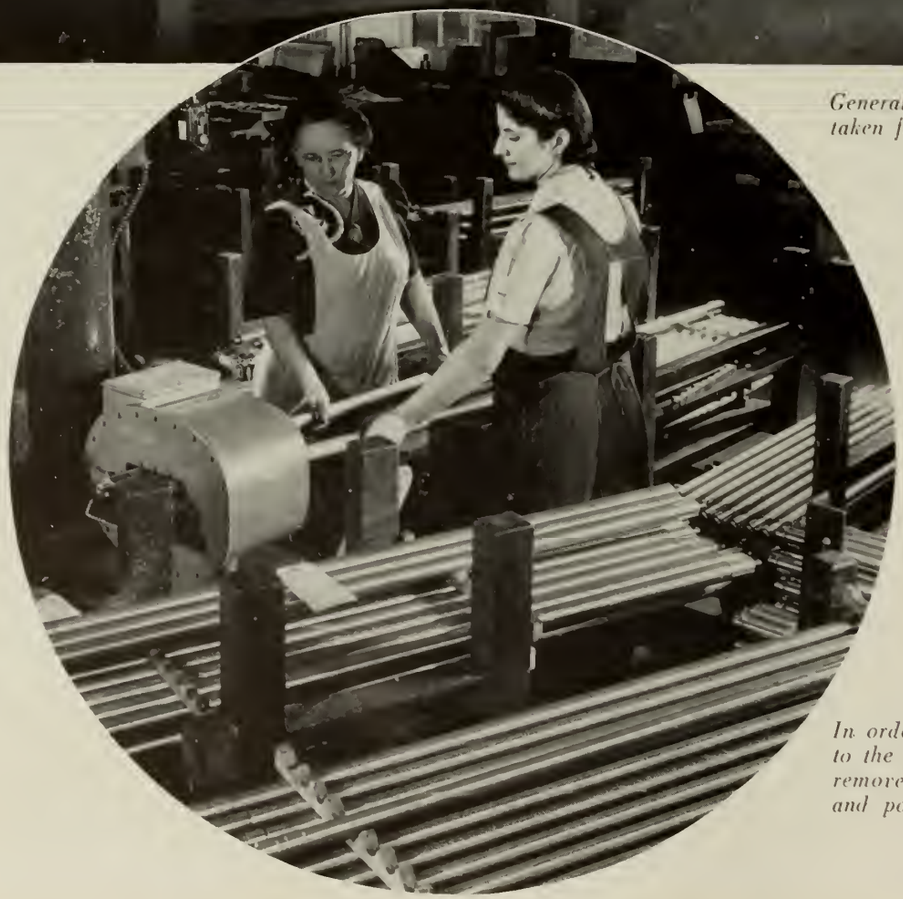
Precise workmanship is necessary for this boring and facing operation.

Production of torpedo parts under direct contracts from the Navy Department started early in 1941. Within a year we held contracts for some 75 different piece parts and assemblies. Our total production of these items will exceed a half million.

Included in this list were such critical items as tail cones, propeller shafts, five types of "A" frames, and bulkheads.

Locating from the large bored hole, this operator mills the ends of the two bottom lugs.

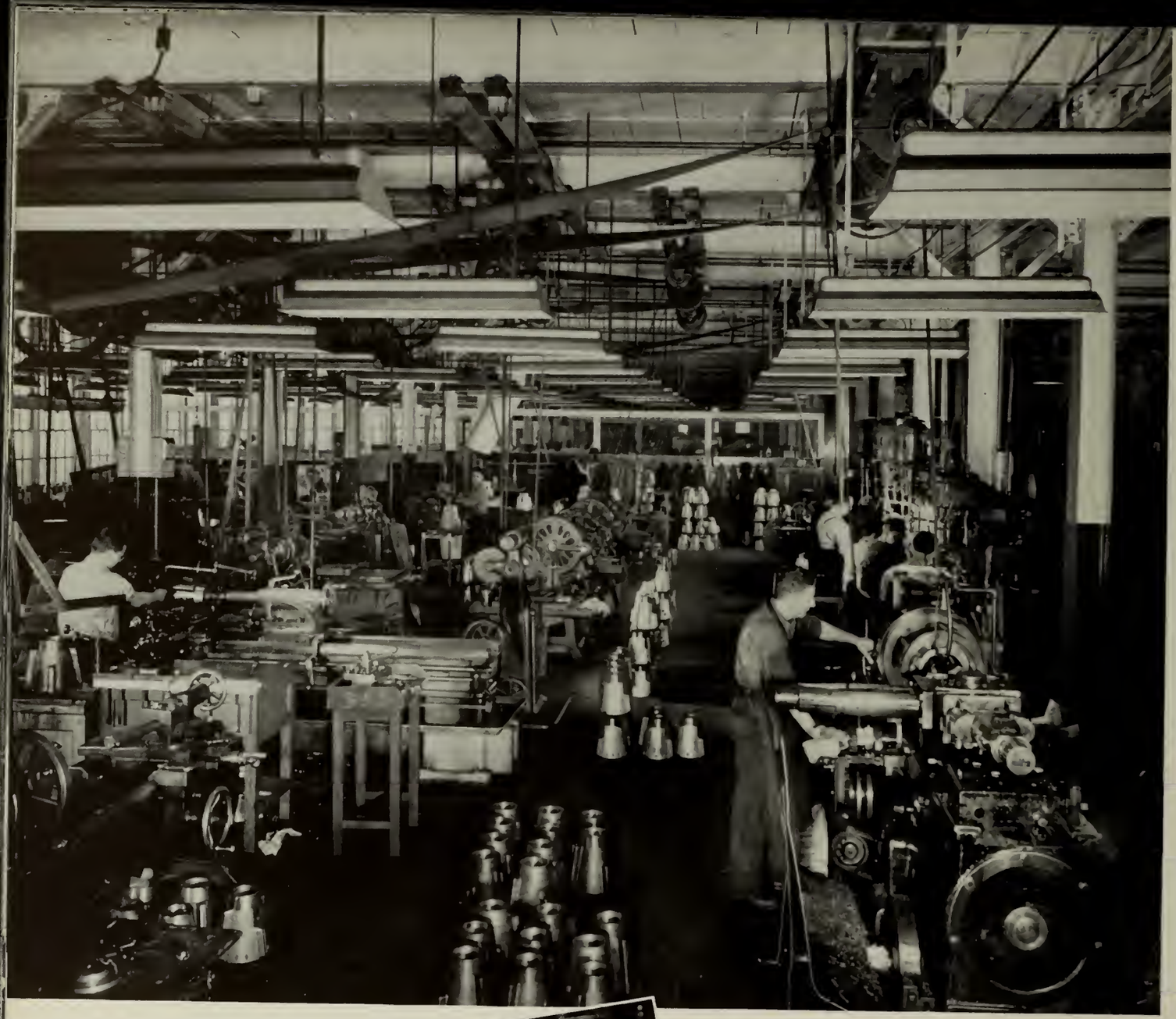
General view of the torpedo parts department taken from the east end of the room.

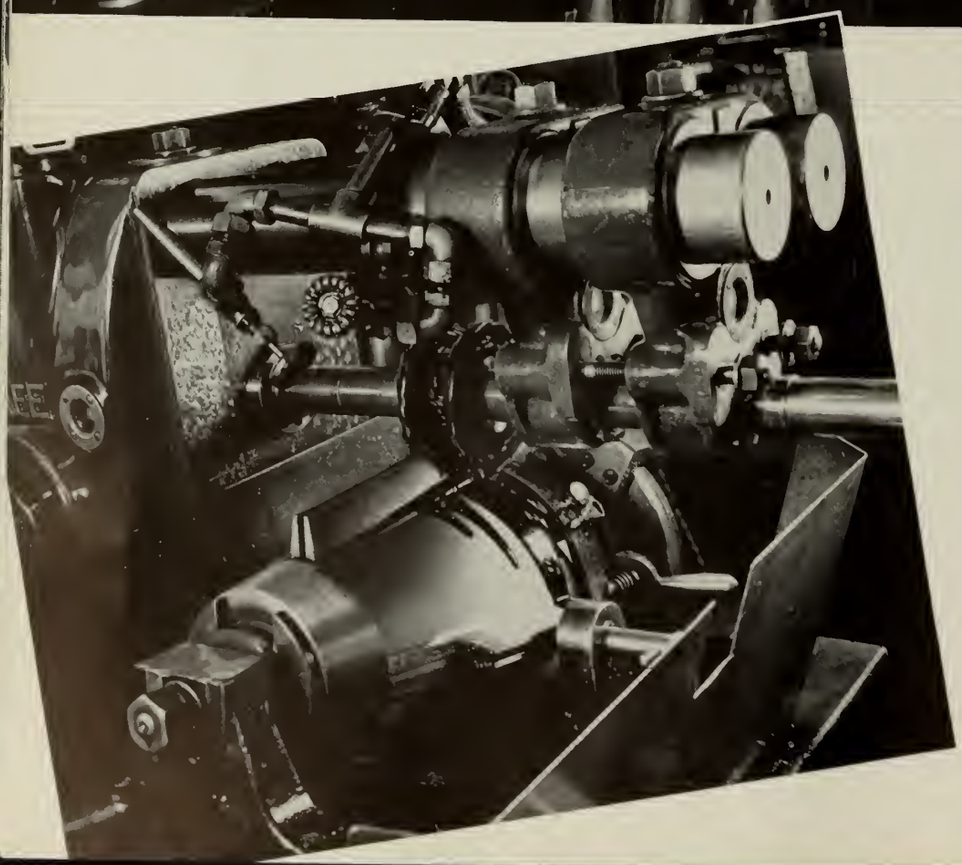


In order to prevent metal particles from adhering to the propeller shafts, they are demagnetized to remove magnetism induced by machining, plating, and polishing operations.

In this inspection room all torpedo parts are thoroughly checked to insure that they meet the close tolerances demanded by the Navy.

One of the more important parts in torpedo construction is this bulkhead which is being turned and faced by a Whitin employee.

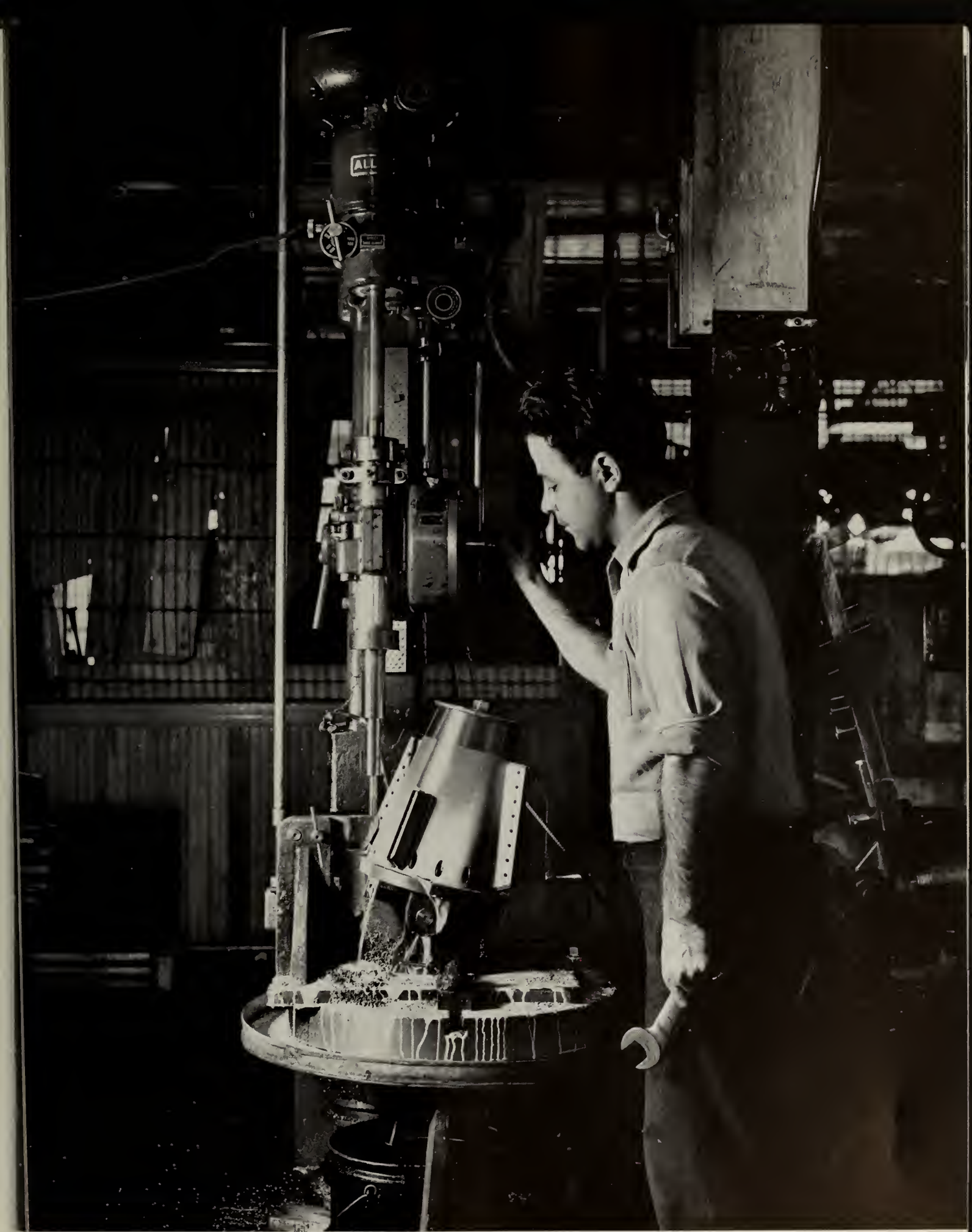




An extremely important part in the construction of torpedoes is the tail cone. Before assembly it is necessary to perform 32 distinct operations.

For the manufacture of this one item, more than 250 jigs, fixtures, tools, and gauges are required, a figure which will give some indication of the equipment demanded for the mass production of 75 different parts and assemblies.

To keep the torpedo straight on its course, slotting and contour milling of the fins must be accurately performed.



A specially developed jig holds the tail cone in correct position while 16 angular holes are drilled for attachment to the torpedo body.

For the Army

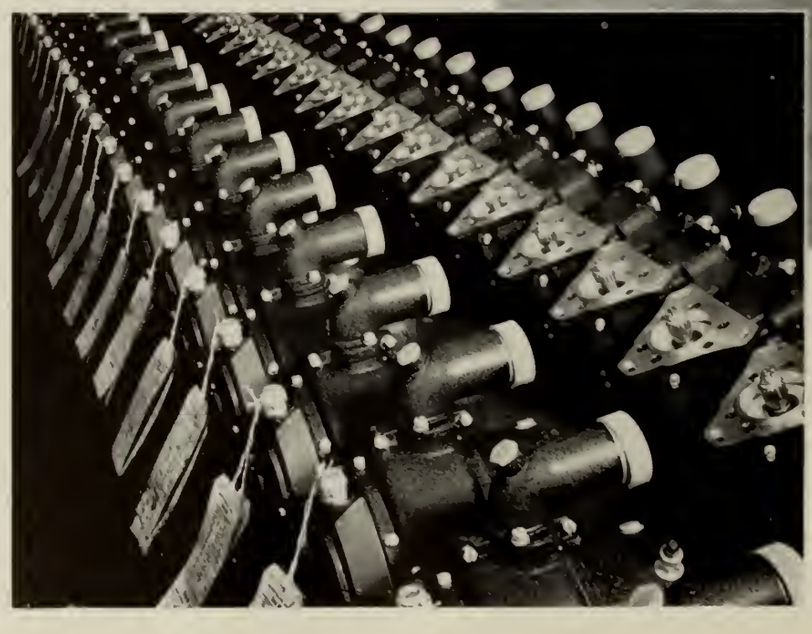
MAGNETOS

★

PROJECTILES

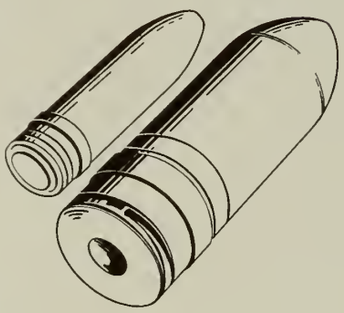
★

GENERATOR INNER SHAFTS
and MOUNTING FLANGES



Completed Bomber magnetos ready for shipment.

Shells



Enemy pilots have a healthy respect for the rapid-firing 20 millimeter anti-aircraft guns used by allied forces. When attacks come, those guns go into action — fast — gobbling up shells at a terrific rate.

Whitin is one of the companies that helped to keep those guns supplied with ammunition. More than 4,000,000 twenty millimeter and thirty-seven millimeter projectiles bearing the Whitin identification mark have been delivered to our armed forces.

General view of room in which secondary operations and inspection of two types of 20m.m. projectiles was performed.

Centerless grinding produces smooth finish on the entire outer contour of the projectile and insures accuracy of dimensions.

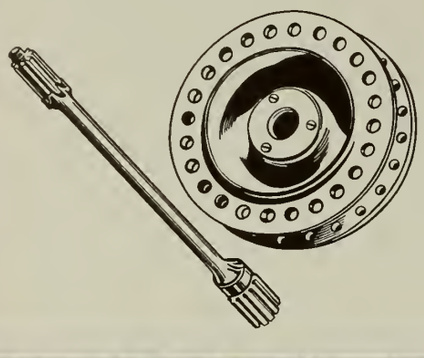
This Rotary Swager hammers the seamless copper band into the recess provided for it in the projectile. It is the soft copper band that engages the rifling in the gun barrel, causing the projectile to spin when fired, thus promoting accuracy of flight.

Every projectile is inspected 100% for weight, concentricity, dimensions, and visible defects. They've got to be right to get in the fight!

To prevent rusting and to help identify the type of shot, the entire exterior with the exception of the copper band is painted in this automatic spraying and drying unit.

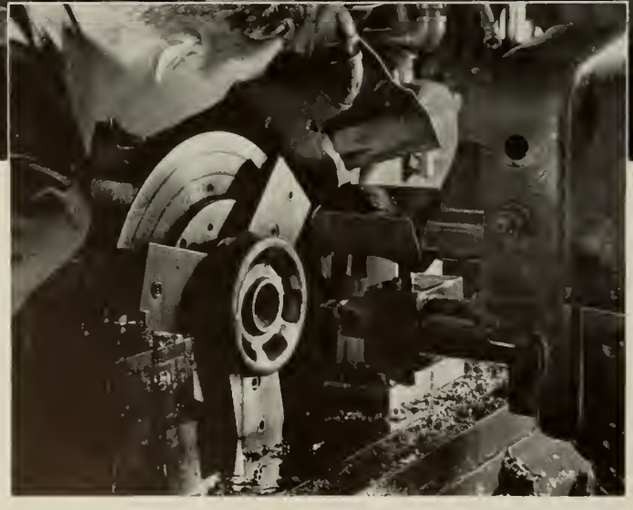
Resident Ordnance Department Inspectors using a highly sensitive, electrically operated Multicheck gauge give the projectiles a final inspection before shipment.

Mounting Flanges



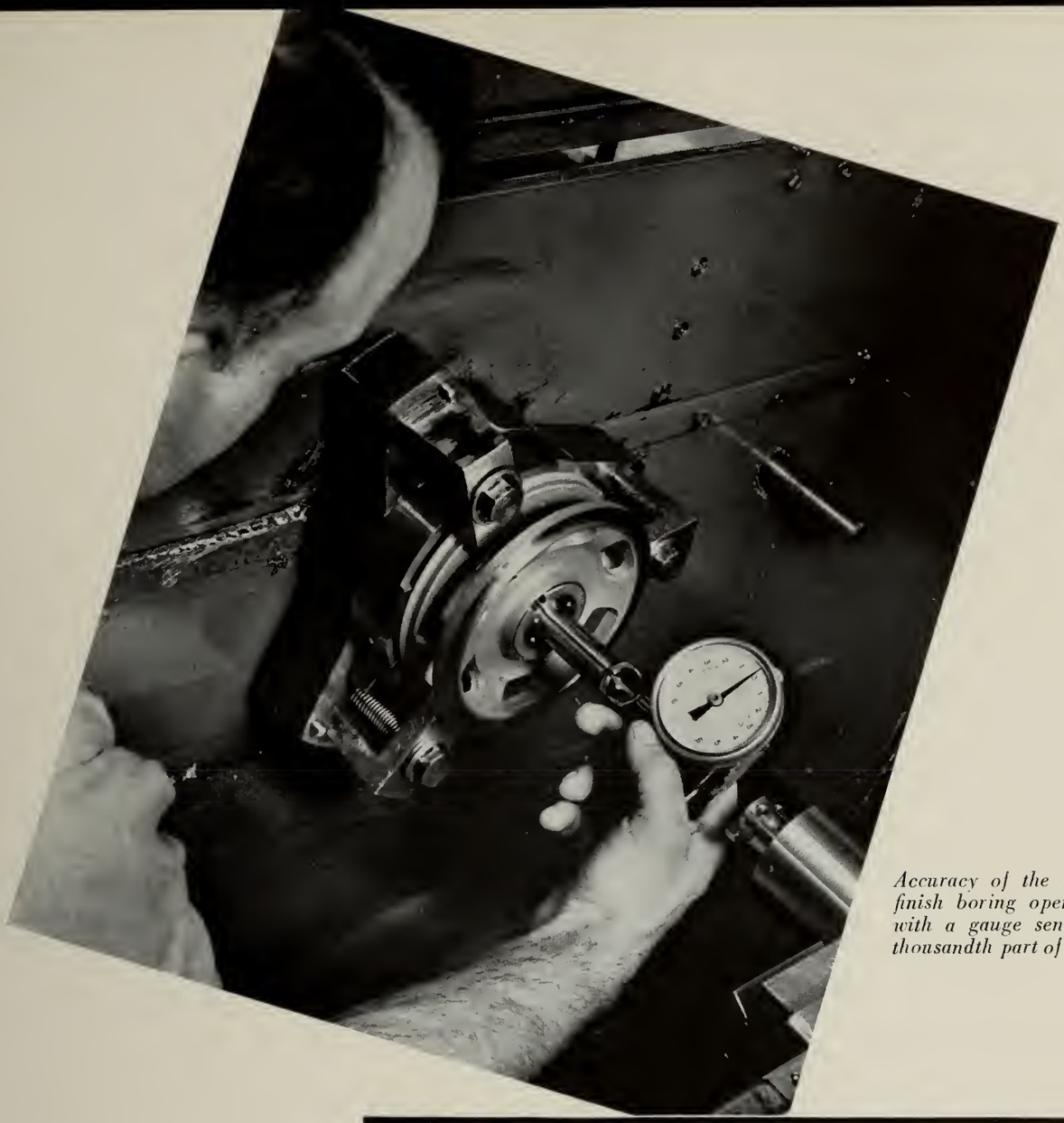
To mount generators on airplane engines, a special forged-steel flange is used, and more than 50,000 of these were produced in our shops.

In addition to the dies which were made for our forge shop, 167 jigs and fixtures and 247 special cutting tools were made for the manufacture of these mounting flanges.



Automatic chucking machines perform the initial operations on the rough forging, turning, facing, and rough boring being performed at this point.

Closeup view shows the forging held in the chuck jaws.

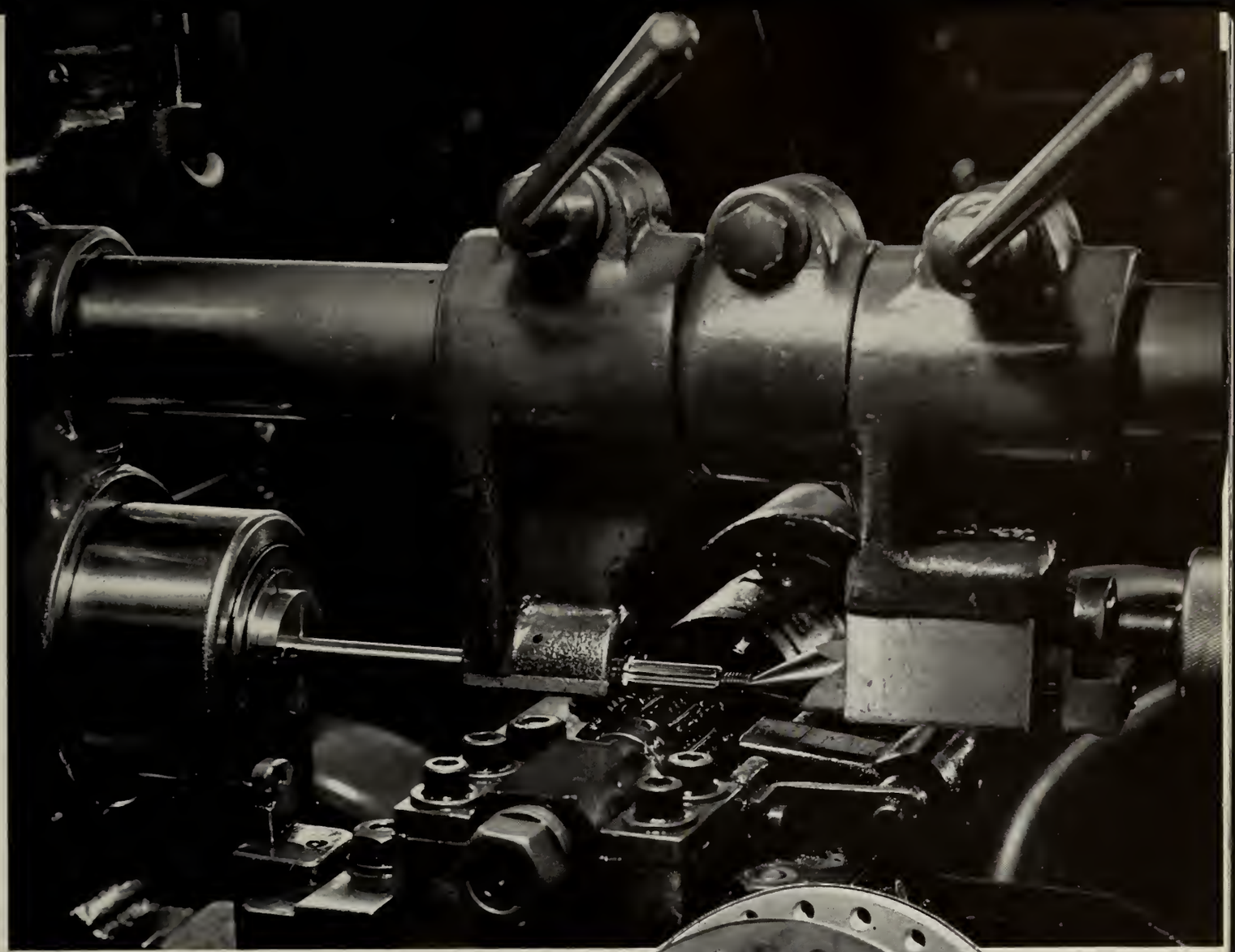


Accuracy of the highly important finish boring operation is checked with a gauge sensitive to one ten thousandth part of an inch.

Inspector watches dial indicators while rotating piece to make sure that it meets concentricity requirements.

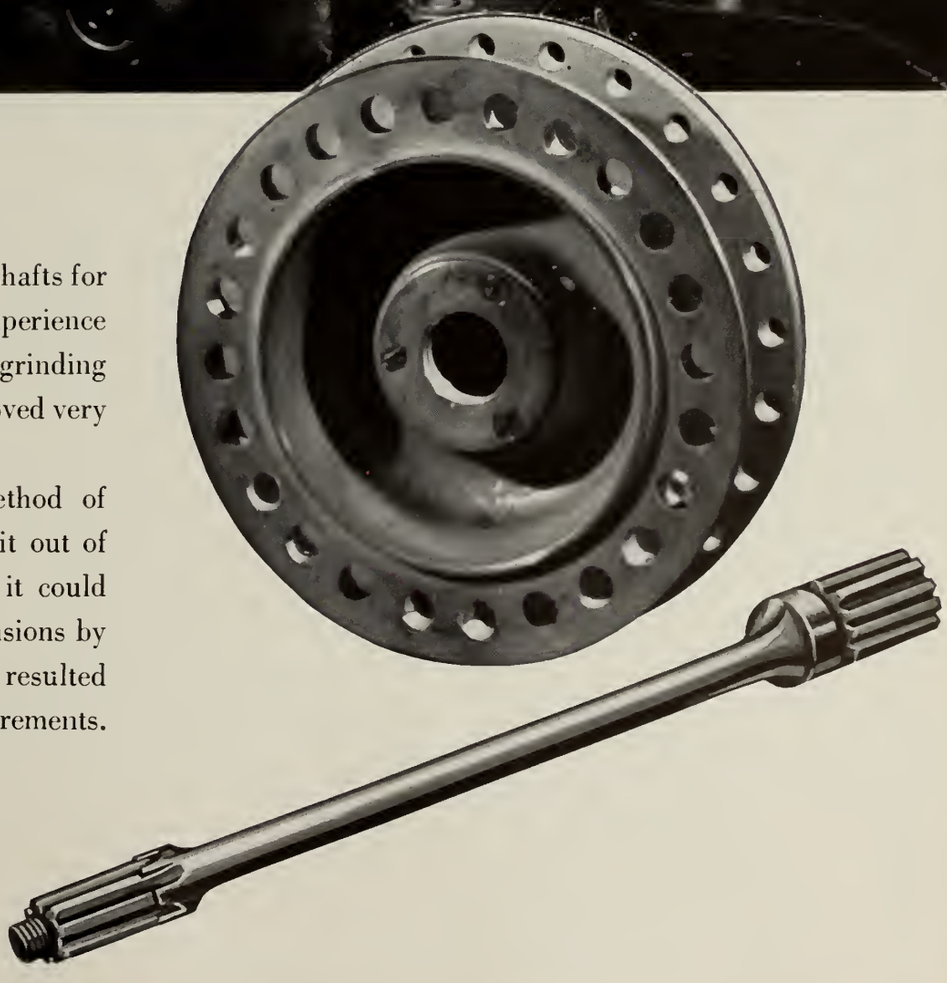
Twenty-four attachment holes, located by a jig, are drilled in the flange on this multi-spindle drilling unit.

To insure that no defective parts are included in shipments, the finished pieces are tested in a Magnaflux unit which unfailingly detects flaws that might exist in the material.

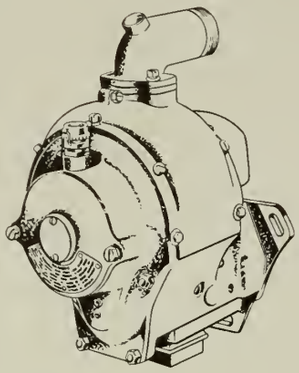


In the manufacture of inner shafts for generators, our many years of experience in forging, straightening, and grinding spindles for textile machinery proved very helpful.

Whereas the customary method of machining this piece is to turn it out of 1″ round stock, we found that it could be drawn out to the rough dimensions by forging. The use of this method resulted in a saving of 58% in stock requirements.



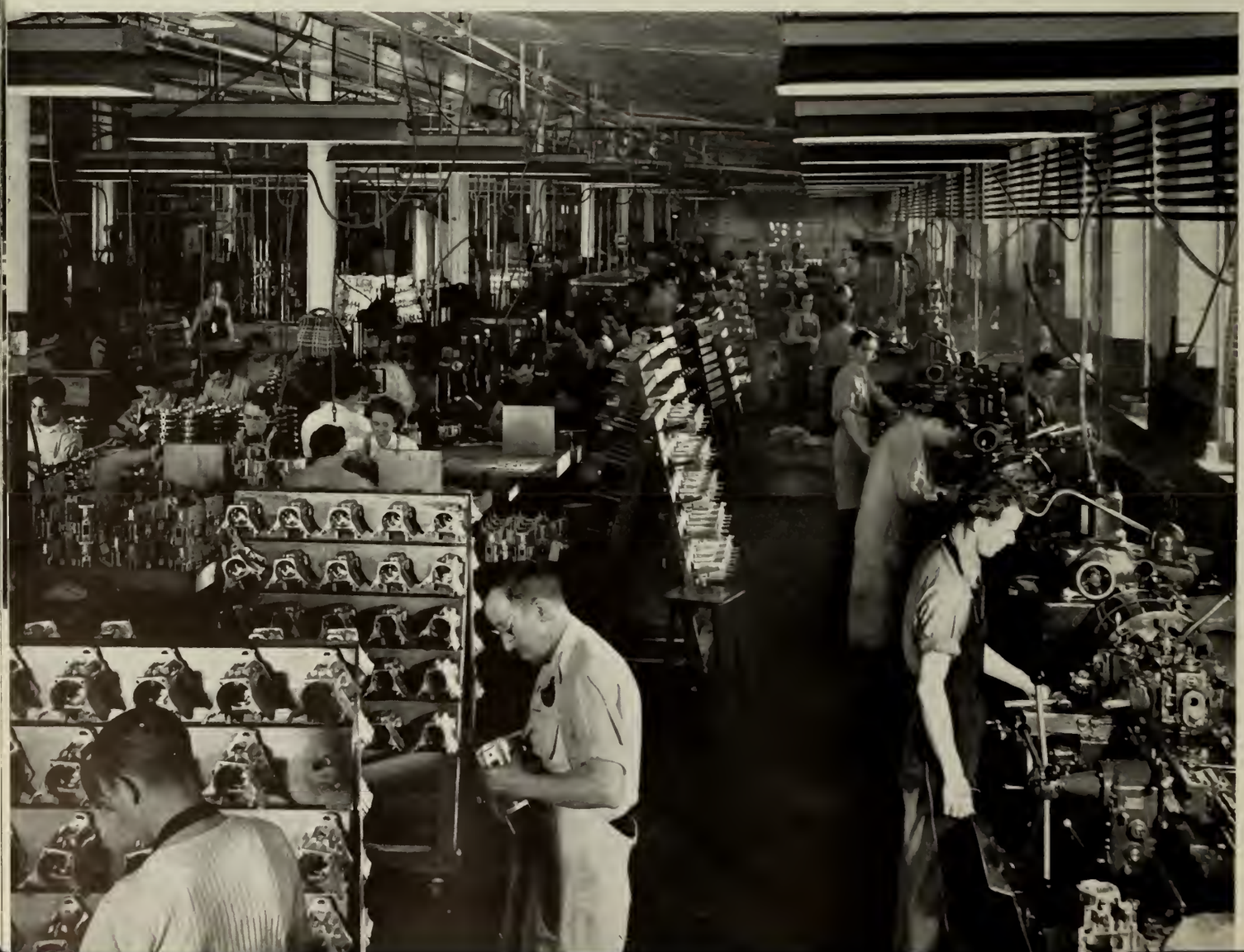
Magnetos



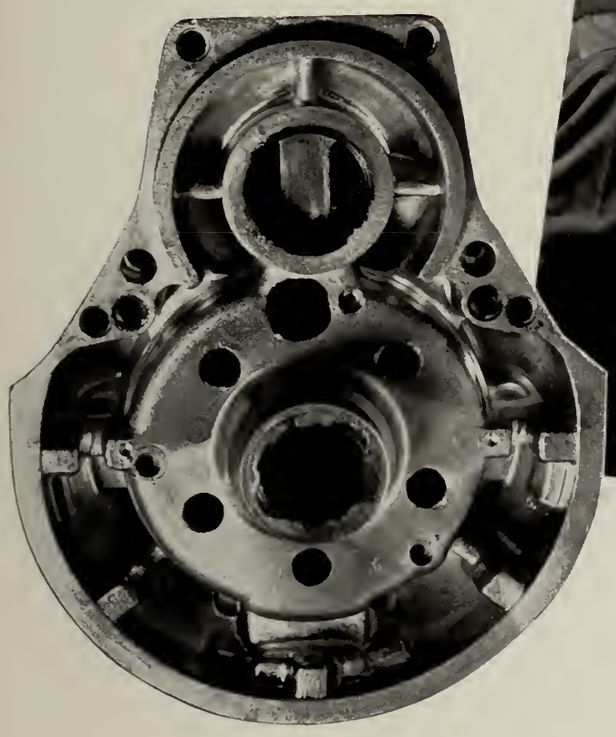
The largest single project undertaken by Whitin in connection with the war effort was for the manufacture of magnetos for aircraft engines. In April 1942, a contract was signed with American Bosch Corporation which provided for our building seven thousand 14-cylinder and two thousand 18-cylinder magnetos per month.

When it is considered that a magneto consists of more than 300 separate and distinct parts (1150 including duplicates) and that it employs a variety of materials demanding a wide range of machining operations, some idea may be gained of the magnitude of the program which was adopted.

Approximately 56,000 square feet of floor space were prepared specifically for manufacture and inspection. More than 100 machine tools of our own were assigned to magneto work and 220 new units were acquired.



The penetrating eye of the x-ray is used to detect hidden flaws that may be present in the gear-housing die casting shown below.



Literally thousands of jigs, fixtures, gauges, and cutting tools were made in our shop or purchased from outside sources, and a working force of about 1100 was assigned to this program.

With this immense amount of planning and tooling-up completed, production of finished magnetos commenced in November and production rose rapidly to schedule thereafter. Our schedule was revised a number of times depending upon the requirements of the Air Corps and the original model was redesigned so that it could be sealed for supercharging.

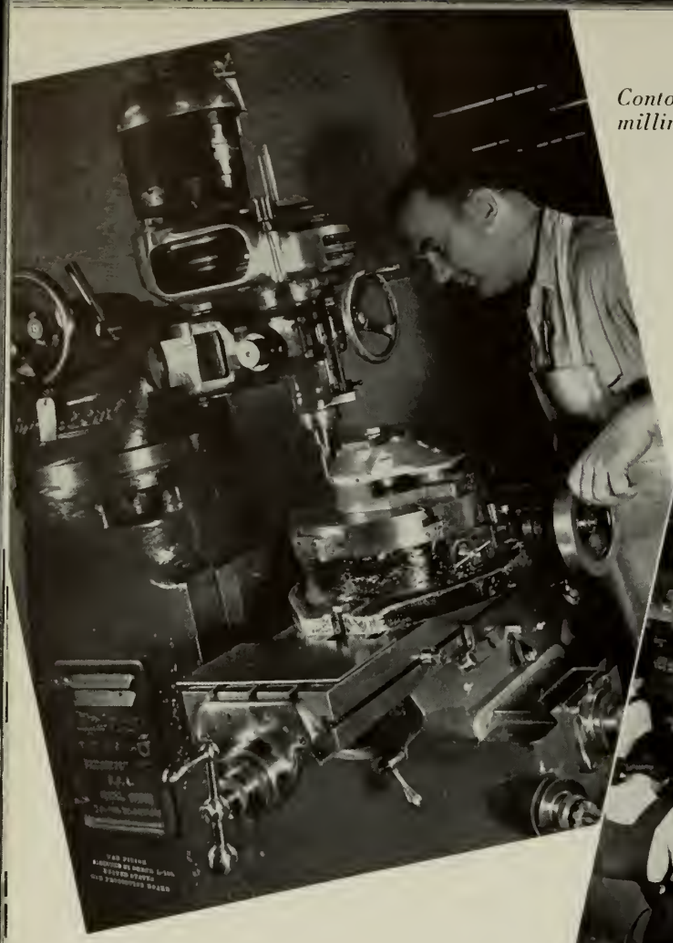
When magneto production was suspended in January 1945, we had produced a total of 73,000 complete magnetos and had furnished spare parts equivalent to 35,000 additional units.

Incoming insulation parts are tested for possible breakdown with a high-voltage spark.

Chipping excess aluminum from the main housing is necessary before machining.

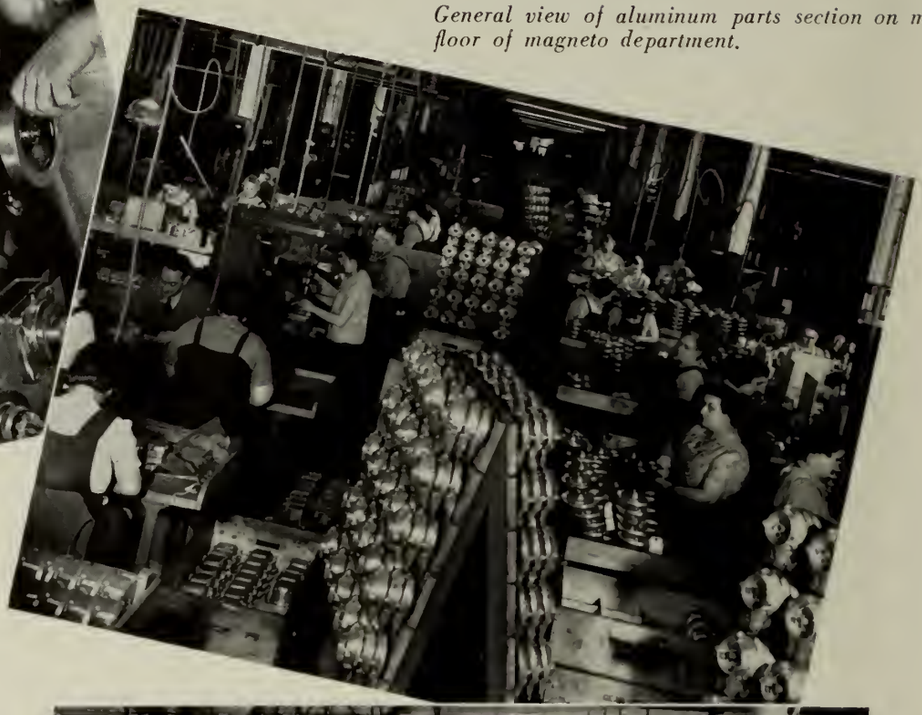
Women are admirably suited to many of the machining operations on magneto parts.

This is one of several hundred new machine tools that were installed for magneto work.



Contour of gear housing is finished on a vertical milling machine.

General view of aluminum parts section on main floor of magneto department.



Infra-red baking tunnel produces attractive wrinkle finish on exterior painted surfaces.

Elimination of burrs, an important requirement, demands much hand work on the more intricate parts.

View of the distributor gear section. Hub, machined in line at left, joins other parts at far end and returns at right as a finished distributor gear.

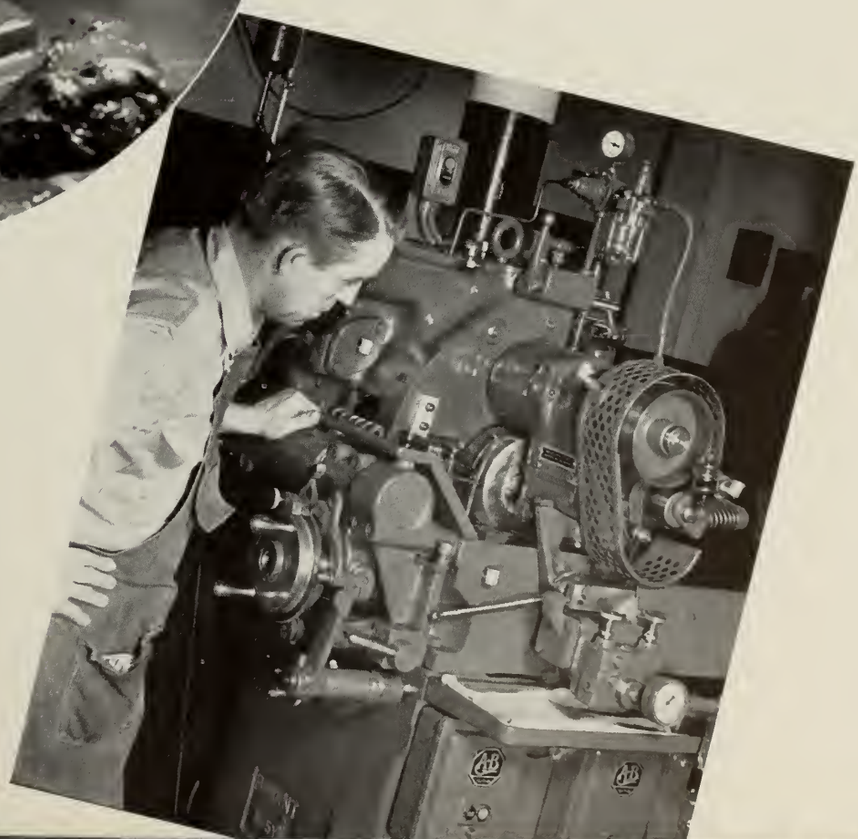
Distributor block electrodes, which carry the spark to the distributor rotor, must be carefully burred and buffed.

Rigid inspection required the services of one-third of the total personnel. Our high standards were rewarded by the assignment of a rating of "A" to our quality-control system by the A.A.F. Inspection Department.

Important heat-treated parts are tested magnetically for flaws.

The cam, which controls the timing of the sparks delivered by the magneto, must be carefully tested for firing point and diameter.

The fourteen lobes of the cam are first ground on the machine below and then hand-finished (left), if required, to remove slight imperfections.



Lubrication of the cam is provided by means of a grease-filled wick contained in a housing.

The bearing diameters of the inductor rotor must be accurate to within two ten thousandths of an inch, and concentricity requirements are also strict.

The heart of a magneto is its coil which must be very carefully constructed under conditions of closely controlled temperature and humidity.

While a special room was being constructed for the coil-winding department, several of our women employees underwent a carefully supervised training period at the American Bosch Corporation plant in Springfield, Massachusetts.

At the completion of their course, these operators acted as instructors for the many other employees that were assigned to this department.

The newly constructed, air-conditioned room provided ideal working conditions for the women who performed the operations of winding, insulating, varnishing, and inspecting the coils.

General view of the coil room showing, in the foreground, the winding and taping of the condenser.

Strips of the highest grade paper are used for insulation between windings. Here they are being cut to length on a special machine.

Fifty-six layers of #39 magnet wire form the secondary winding. The winding machines were built in our own shop.

Later this process was simplified by the use of semi-automatic machines which wound ten coils at a time.

The whole winding is bound with rayon tape and sealed with ten individually baked coats of varnish.

Two special electric ovens were installed for baking the varnish to insure an oil-tight seal.

After sealing, a small opening is left through which the coil is filled with oil in this vacuum-pressure apparatus.

Army Air Force standards required rigid inspection of all raw materials and of each component part during manufacture and after completion. Moreover, the completed magneto was run, tested for electrical performance, and then completely disassembled and checked before reassembly and shipment.

This comprehensive inspection program made necessary the purchase or manufacture of hundreds of gages, testing fixtures and instruments. Among other interesting units were a completely equipped x-ray laboratory, an instrument for magnetically detecting flaws in steel parts and another for determining the grade of surface finish.

One of the many electrical tests given the finished coil.

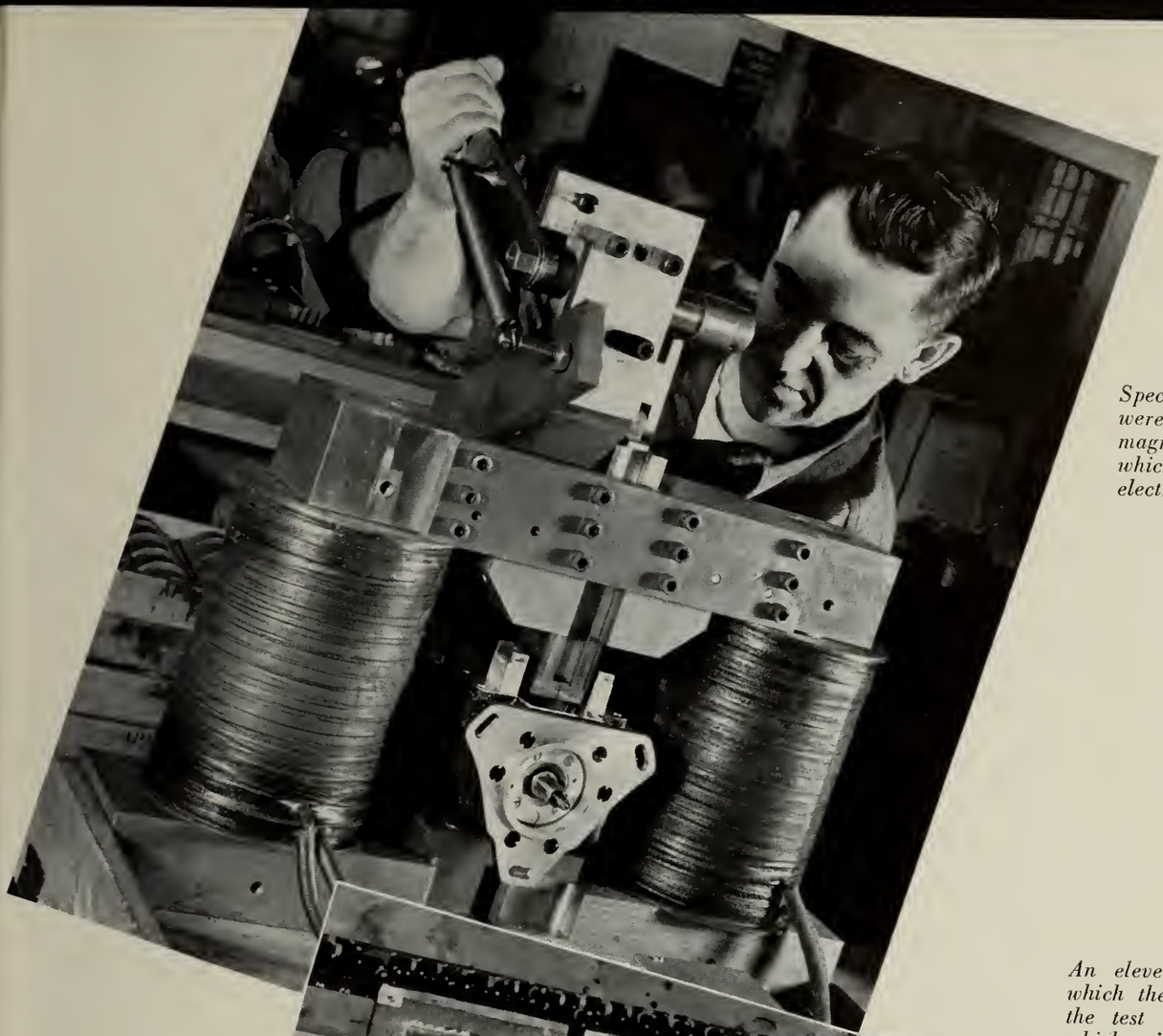
Our inspection office was constantly busy checking and adjusting all gauges in accordance with a definite schedule.

A large area was devoted exclusively to the search for imperfections in finished parts.

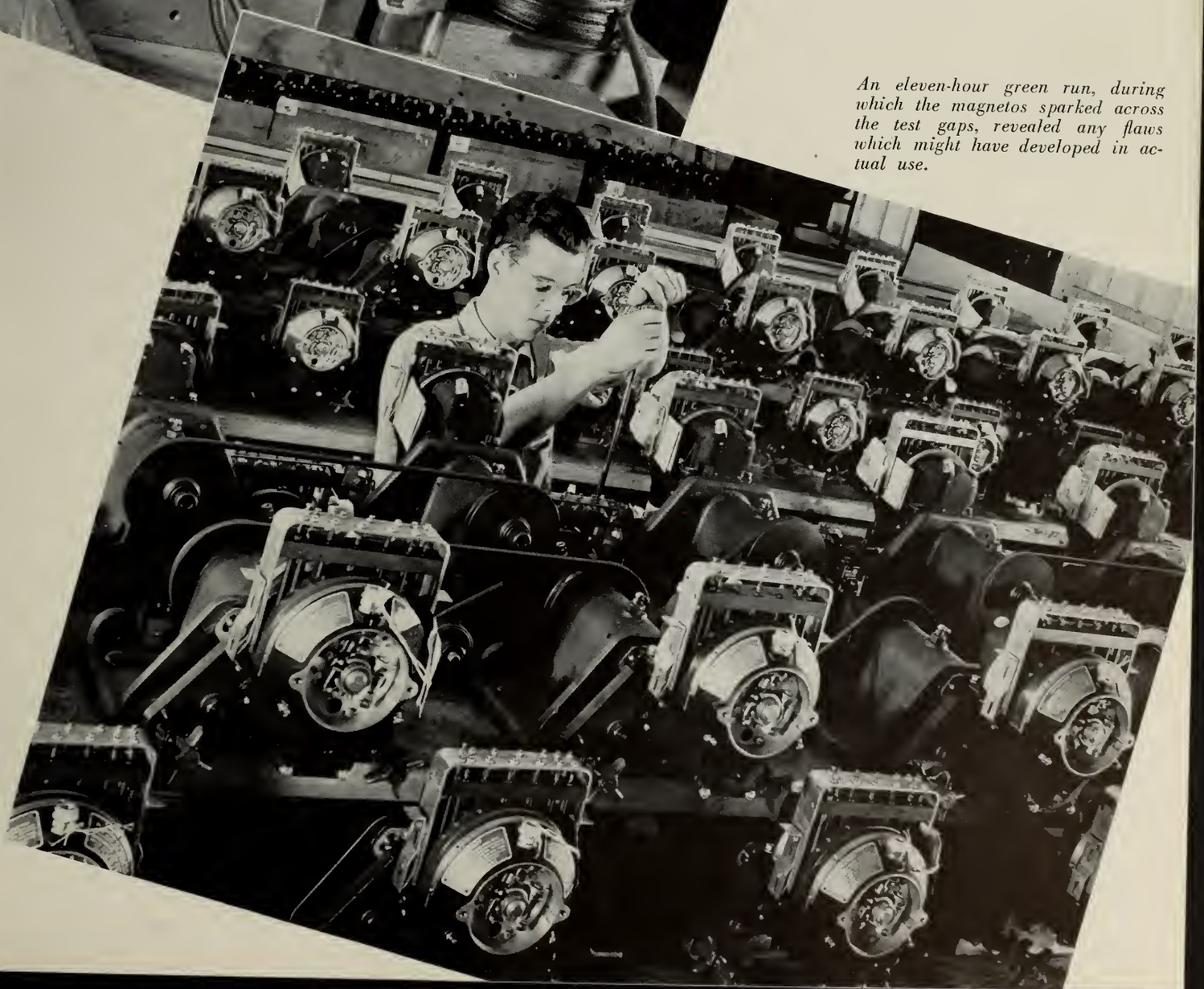
Resident Air Force inspectors helped maintain high quality standards by partial inspection of our product.

In the green assembly room, magnetos took form at the rate of 1100 per week.

Many women were employed in cementing synthetic rubber gaskets to various parts before assembly. Fumes from the cement were removed by an exhaust system, ports for which can be seen in front of each operator.



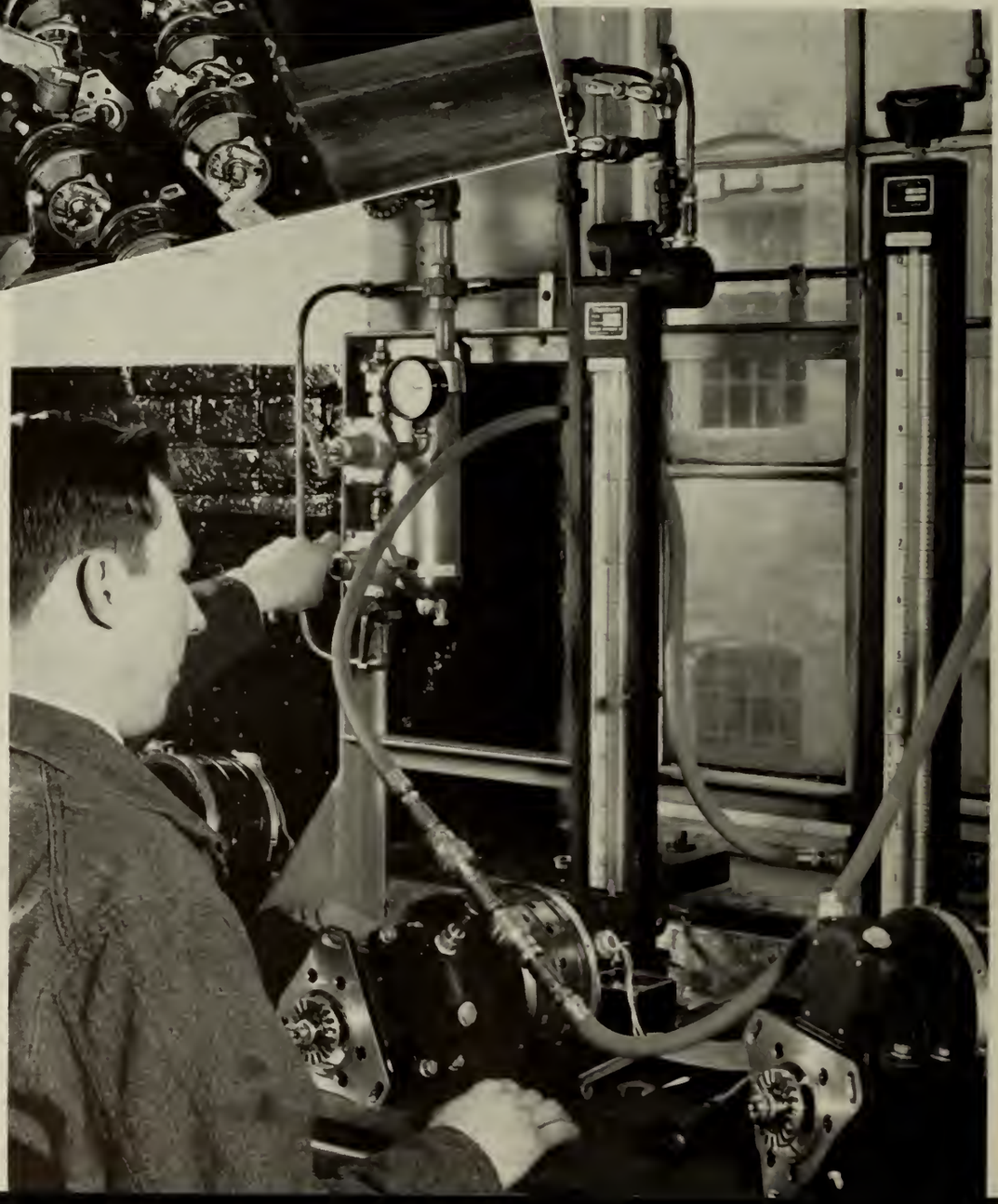
Special magnetizing fixtures were built to provide the magnets with the energy which was the source of the electrical current.



An eleven-hour green run, during which the magnetos sparked across the test gaps, revealed any flaws which might have developed in actual use.

After the green run each unit was torn down and re-assembled.

On the supercharged model. each magneto was tested for its ability to hold air pressure.



Having passed all previous tests, the finished magnetos are given a final examination and stamp of approval by an Army Air Force Inspector.

Through fair and foul weather our truck made regular deliveries to the American Bosch plant in Springfield, Massachusetts.

Miscellaneous Parts

In addition to the programs already described and illustrated to some extent, a large quantity of miscellaneous parts were produced. While these items individually did not require such extensive use of floor space, machinery, or personnel, they were important items and, in the aggregate, represented a substantial contribution to the war effort.

Grey iron castings totaling 1250 tons and machined parts numbered in hundreds of thousands were supplied to many different manufacturers of vital machine tools.

For the aircraft industry, our screw machine department, hard pressed as it was with our own requirements, was able to produce 700,000 screw machine blanks.

We also machined to extremely accurate dimensions 2000 pieces of stainless steel tubing used in connection with submarine detector devices.

For Diesel engines, one thousand complete governors and nearly 31.000 components parts were produced.

More than 160.000 ring gears were fashioned from sheet stock sheared into strips and milled to the required dimensions, the gear teeth being cut on a specially equipped rack-cutting machine. These ring gears were used in connection with horizon indicators for aircraft.

★ A Message ★

FROM OUR PRESIDENT

★

The purpose of this book is to preserve, for the people who worked in the Whitin Machine Works during these years of World War II, a record of achievement of which we are very proud. This record was made possible only by the patriotic and intelligent efforts of these people.

When the War started we were building our peace-time product — textile machinery. We converted the entire plant to the production of essential war goods, in an incredibly short time, manufacturing machines and parts with which we had had no previous experience.

★

Referring to our performance in meeting production schedules, one government agency wrote in part as follows:

> "It has exercised unusual ability in accomplishing what appeared at times to be almost an impossibility.
>
> In lieu of lagging, in meeting various schedules of delivery, they have been in many instances ahead of schedule, so much so that we were compelled to curtail their activities.
>
> To reiterate, the subject company has not only been a most satisfactory contractor, but, comparatively speaking, its performance has been outstanding."

★

We hope this illustrated book will be of interest to all the members of the Whitin organization. Our many friends in the textile industry can see from these pictures how one industrial concern departed from the manufacture of its regular products in order to devote its efforts to the production of materials more vitally needed by a nation at War.

Yours sincerely,

E. Kirk Sturgis

President

WHITIN TEXTILE MACHINERY

Our Peace-Time Products

IN THE preceding pages we have shown what Whitin produced as a result of the emergency created by War. Textile men the world over are well acquainted with the normal products of the Whitin Machine Works, but for the benefit of new friends into whose hands this book may come we are listing the famous Whitin line of preparatory machinery for all textile fibers.

★

COTTON MACHINERY

Cleaning
Opening
Conveying
Distributing
Picking
Return Air Condensers
Revolving Flat Cards
Sliver Lap Machines
Ribbon Lap Machines
Combing Machines
Drawing Frames
Roving Frames
Spinning Frames
Himalaya Yarn Attachments
Spoolers
Twisters
Reels
Quillers
Automatic Bobbin Winders
Whitin Long Draft Systems

SILK AND RAYON MACHINERY

Staple Cutters
Roving Frames
Upstroke Rayon Twisters
Downstroke Twisters
Ring Twisters
Rayon Reels
Automatic Bobbin Winders
Warp Knitting Machines
Staple Rayon Machinery

COTTON WASTE MACHINERY

(Cotton and Woolen Systems)

Openers
Pickers
Willows
Card Feeders
Full Roller Cards
Condensers
Revolving Flat Cards
Derby Doublers
Hard Waste Machines
Roving Frames
Spinning Frames
Spoolers
Twisters

WOOLEN MACHINERY

Rag Pickers
Mixing Pickers
Garnett Machines
Tandem Feeders
Auto. Stock Conveyors
Automatic Feeders
Ceiling Condensers
Auto. Card Feeders
Breaker Cards
Metallic Breasts
Scotch Intermediate Feeds
Finisher Cards
Tape Condensers
Waste End Conveyors
Flake & Nub Yarn Attachments
Wool Spinning Frames
Twisters
Dresser Reels
Auto. Bobbin Winders

WORSTED MACHINERY

Dandy Roving Frames
Cone Rovers
Cone Reducers
Ring Spinning. Bradford System
Ring Spinning. French System
Ring Twisters
Changeovers, Cap to Ring or Flyer to Ring
Automatic Bobbin Winders

ASBESTOS MACHINERY

Mixing Pickers
Automatic Card Feeds
Full Roller Cards
Camel Back Feeds
Condensers
Flyer Spinning
Flyer Twisters
Ring Spinning
Ring Twisters

SUPPLIES

Rings
Hank Clocks
Magrath Clutches
Card Grinders
Spindles
Roll Spreaders
Rolls
Flyers
Bunch Builders
Recovering Metallic and Breast Rolls

WHITIN MACHINE WORKS

WHITINSVILLE, MASS., U.S.A.

CHARLOTTE, N. C. ATLANTA, GA.

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